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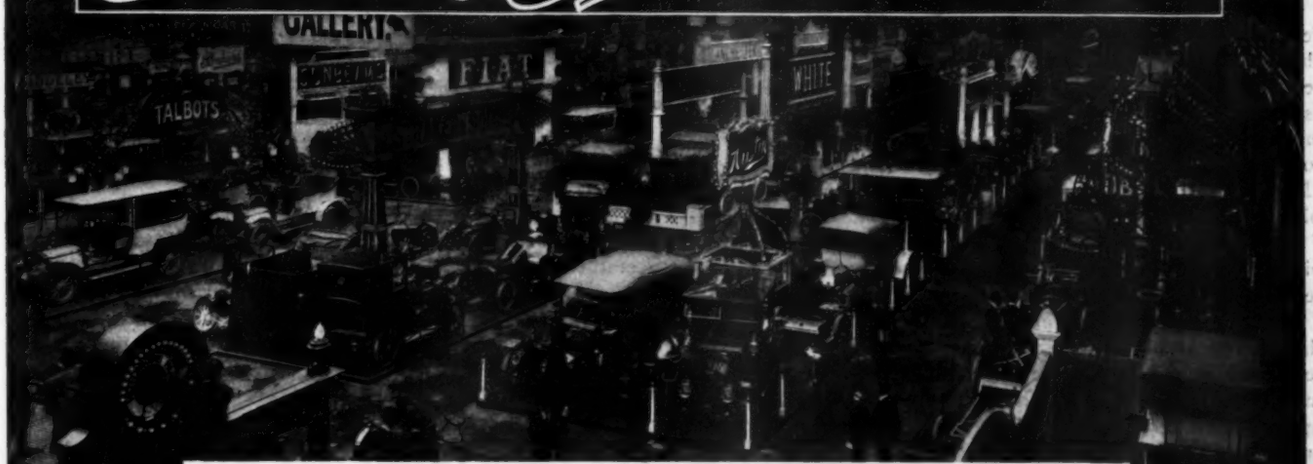
THE AUTOMOBILE

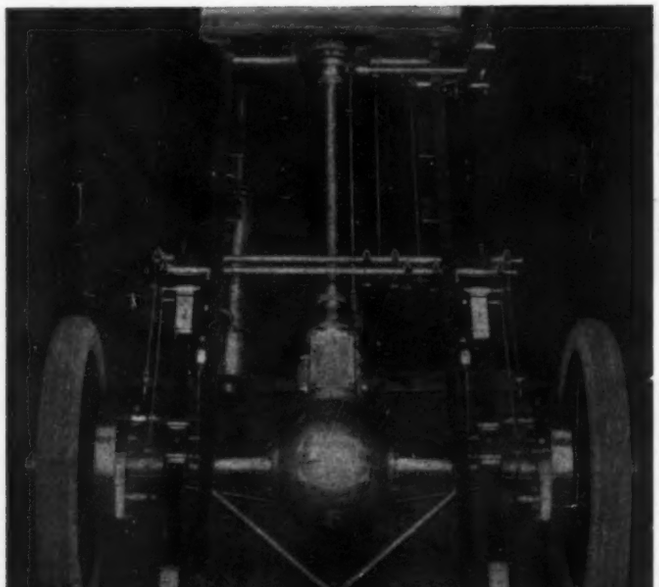
Olympia International Show
Seventh Is a Splendid Display



LONDON, Nov. 13.—The Society of Motor Manufacturers and Traders opened their seventh annual pleasure vehicle show at Olympia this morning, under the patronage of the King. Unlike previous years, there was no opening ceremony, but there was no lack of visitors in consequence, and from the opening hour of 10 a. m. a steady stream of better class visitors made their way in. This of itself marks a distinct change from former shows, when the first days have not attracted much attention. Already good signs of business are apparent and the end of the first day finds the general body of exhibitors in an excellent humor.

In all past exhibitions the racing car has been a big attraction, and the stands that included the battered victors of the season's speed contests always attracted interested crowds. This is to be no more, for, complying with public opinion—or that section of public opinion which is represented by two or three noisy half penny papers—the promoters decided that anything that savored of motor racing must be banished forthwith. Hence it is that the Hall to-day contains neither racing car, nor is any literature permitted to be distributed that appertains to so terrible a sport!

But while many will be found to criticize the promoters' action in this respect, the majority both of exhibitors and of purchasers will probably agree with the decision to abandon trial rides. The experience to be gained in a few minutes' ride around the building would not materially influence a purchaser, and yet such runs have in



Gear-boxless Sheffield-Simplex Chassis.—Rear View.

the past been a big source of trouble and expense to the exhibitors. The serious purchaser can now make a definite appointment for a more thorough test and the only person that will be disappointed is the man who is accustomed to go up to Hammersmith for an afternoon's outing on the cars. This class became too numerous for the comfort of the exhibition to tolerate.

Everywhere can be observed the tendency towards reduction of noise. Just as a year ago engine flexibility and the perfection of the lubrication system were the aims of the designer, so now noiselessness is the feature on which greatest stress is laid. In the case of the Daimler-Knight valveless engine absolute silence of operation is put forward as its biggest advantage. Numerous other makers retaining the mushroom valve engine have adopted the plan of covering the whole of the valve arrangement with an aluminum plate, and also, of altering the form of the valve lifting cam. Throughout the rest of the car this quieting process is apparent. The exhaust long ago ceased to be objectionable, so now the incoming gases are silenced, the Daimler and Iris carburetor being prominent in this respect. The gear pump has been replaced on several cars by the smoother-acting centrifugal variety, or better still, has been omitted altogether, the natural circulation being now relied on. Other instances present themselves in this refining process, and if for the next show designers will but consider the question of reducing the dust raising properties of their cars, the public will have little to complain of.

Of general tendencies of design much is apparent. During the past season the various voiturette races in France and the "four-inch" race in this country have shown what excellent results can be obtained from a well-designed and carefully constructed small car. As a result there is a big increase in the number of such cars staged, these being frequently met with on the stands of the best known makers.

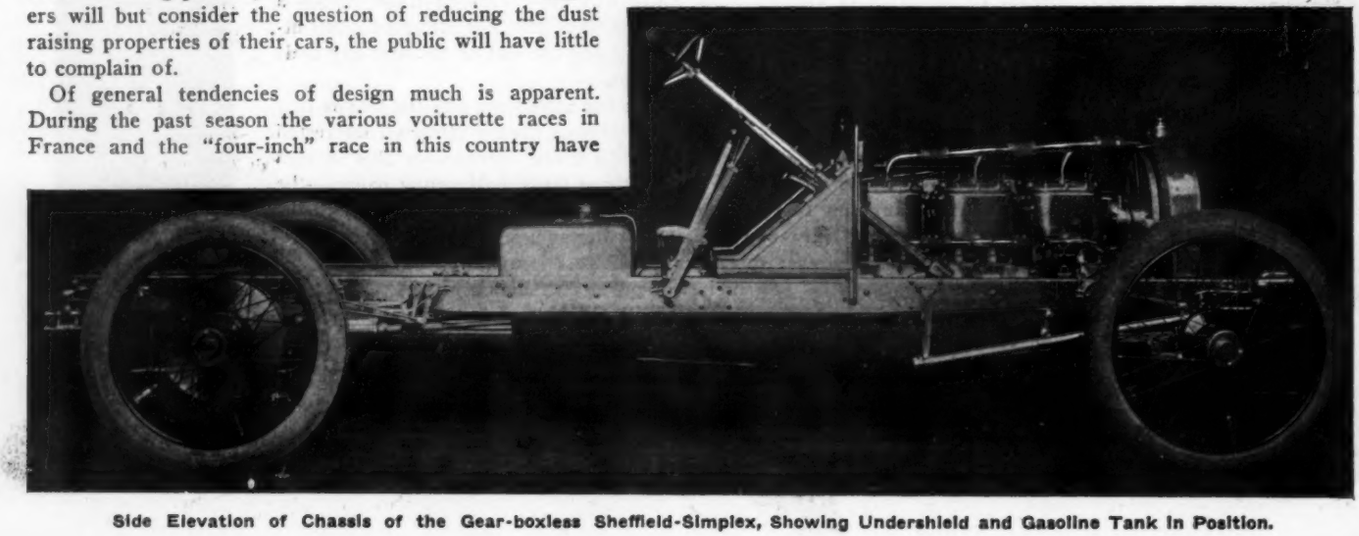
The single cylinder engine has almost lost its premier position by reason of the popularity of the small four-cylinder variety, in which the bore is as little as 65mm.—this being the case with the De Dion and the Martini. Even the six-cylinder engine has found its adherents, and such cars as the 12-horsepower six-cylinder Delaunay-Belleville are well worth inspection. Interesting examples of these small cars will be detailed later.

What the Motors and Their Appurtenances Show.

A second feature of note in engine construction is the re-introduction of the twin-cylinder type. At last year's show this form of engine had almost entirely disappeared and engine types seemed definitely to have resolved themselves into the single, the four and the six. The popularity of the engine of about 10-horsepower has now led to the feeling that something between the one and the four is required, so that the twin-cylinder engine is likely to have a greater vogue than ever. Hardly less noteworthy than the increase in the voiturettes is the prevalence of the "four-inch" engine—usually with a five inch stroke, but tending, if anything, to exceed this value. The increased power given by these small engines is well indicated by the generous provisions of covered bodies on such cars, whereas in former years nothing smaller than a 30-horsepower 4½ by 5 engine was considered sufficiently powerful for a limousine or full-sized landaulet. As a natural result the bigger type of car tends to decrease in numbers, and by next year this decrease should have assumed definite proportions. Beyond the big car there still exists a class which is to all intents and purposes a racing car with a small and uncomfortable touring body fitted. Among cars of this type that are on view may be noted the 100-horsepower Germain and the 90-horsepower Napier, Fiat, and Gobron-Brillié.

The general success of the long stroke and high piston speed engine in the four-inch race showed itself almost too late to affect the present models. This tendency, however, can be observed in the case of the smaller cars, where the stroke is between 1¼ and 1½ times the bore. Apparently not a single car in the show has an engine with stroke less than the bore—a change from last year, when several examples of the 4 by 3 and 5 by 4 type were staged.

Cylinders all cast in one block now find general favor. The former big objection of excessive cost of replacement when a cylinder was damaged is greatly discounted now that the public realize that cylinders do not require replacement every few months. From the maker's point of view the saving of space, as well as the general simplification of the piping and water connections, makes the block casting a favorite.



Side Elevation of Chassis of the Gear-boxless Sheffield-Simplex, Showing Undershield and Gasoline Tank in Position.

In the Deasy 15-horsepower model, as in the 18-horsepower Ford, this method is carried even further, and the top half of the crankcase forms one casting with the four cylinders. This design makes a very neat job indeed, and by casting the supporting arms in aluminum and bolting to the engine casting, the latter is kept from becoming unduly cumbersome.

Ball bearing engines have not increased in numbers and the practice may therefore be regarded as still under trial. In other parts of the running gear the ball bearing is almost universal.

The general introduction of forced lubrication systems was a feature of last year's exhibition, and to such an extent has this commendable practice been carried that now the splash system with drip feed is retained only on the cheapest type of voiturette.

Carburetters are still far from settling down to uniform design, and hardly any maker has retained the 1908 carbureter without change. The two and three jet type is frequently met with, but the uncertain spring controlled devices are still in great numbers. On the Daimler three-jet carbureter a water-heated silencer is fitted.

A year or two ago the pressure fuel tank at the rear seemed likely to disappear, its two enemies being its liability to choking of the pipes and its alleged dust raising qualities. The latter has in general been disproved by the Royal Automobile Club experiments, while the first named trouble is obviated by dispensing with the exhaust gas and employing in its stead air pressure from a pump driven off the camshaft. The fact that this air pump might be made larger and used to operate a self-starting system does not seem to appeal to the generality of designers and but a few cars—the S. C. A. T. and the 60-horsepower Fiat for example—are so equipped.

The many other forms of self-starters so eagerly brought forward two years ago have all entirely disappeared

In the ignition section the high tension magneto is almost universally employed. Even the low tension variety has finally lost its popularity with the Italian cars and is not found save on a couple of Fiats. In spite of the fully-proved reliability of the magneto, however, there is still a general practice of fitting an accumulator and coil system as a standby, but whereas last year this was invariably of the high tension distributor with one coil type, several makers have this year used the low tension distributor with a special four unit coil having but a single trembler. This is found to give a good synchronization of the former type with less cost and insulating trouble.

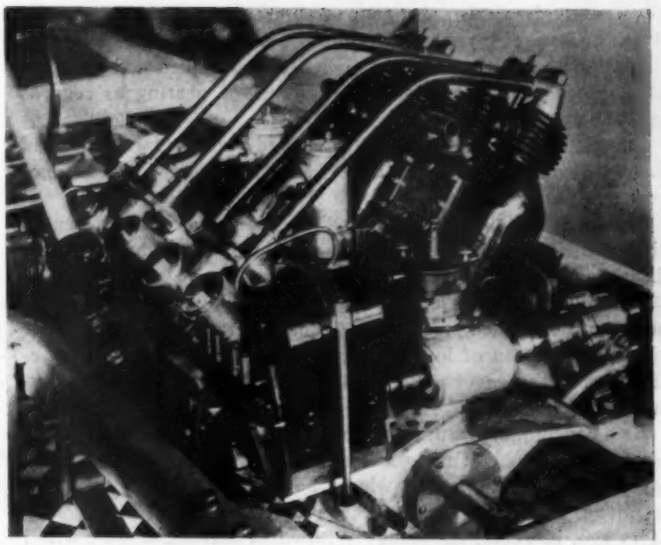
In the Matter of Gear Boxes and Clutches.

A general—and necessarily hurried—examination of the cars leads to the conclusion that clutches are in the same position as last year, as far as popularity of the rival form goes. Several new makers fit the disc clutch, and particularly is the new Hele-Shaw clutch remarkable in that all parts, save the phosphor bronze outer plates, are of pressed steel, thus effecting considerable weight-saving. On the other hand one or two makers, including Austin and Weigel, have reverted to the leather cone clutch, so that the balance of power is almost unaltered. The other types of clutch, whether of the expanding or the contracting variety, have almost disappeared, and the Motobloc and the Mors are probably the sole remaining exponents of the two types. The use of cork inserts has not yet come into favor on this side.

Meanwhile the hydraulic clutch is being quietly worked out, and it is said that by the next show a satisfactory example will be exhibited of this combined clutch and gear which would seem likely to oust, altogether, the present unmechanical devices.

The gearing question now seems to demand but little attention and most of the cars have the form of three or four speed gear box, which has served them for several years. The use of third direct and an indirect fourth gear, a feature of the last show, has but a few fresh adherents.

It was rumored that several Panhards of new and popular power would be shown, fitted with the epicyclic gear. This, for a well known French firm, would be sufficiently a novelty to cause comment, but the non-appearance of these cars makes it necessary to await the Paris show for further information.



Motor Shown by the Two-Stroke Engine Company, Ltd.

In spite of the flexibility of the six-cylinder engine, only one maker has been found to dispense with the gear-box. The 45-horsepower Sheffield Simplex has this feature to recommend it, but even here a reverse has, of course, to be fitted, and while arranging for this in the rear axle casing, the makers have thoughtfully added a low forward speed "for emergency use," so that the novelty of the step rather disappears. All the same this proceeding effects an appreciable saving both in weight and in the number of parts, and the increased simplification of the chassis is certainly surprising.

Several other makers—notably Napier in his smaller cars—have arrived at a similar result by moving the gear-box up to the engine, of which the flywheel is placed right forward against the radiator. As will be shown later, the Napier gives a very neat and simple car.

For the final drive, there can be no doubt but that the chain is dying out, except for the highest powers, and here again it only shares the honors with the shaft-drive. In its turn the shaft and

Chassis of the F. N.—A Well-known Popular Type.

bevel drive is rivalled in medium powered cars by the worm drive, and another year will probably show a big advance in popularity of this last type, which, when well designed and cut, possesses such advantages over other forms of gearing as regards quietness and smoothness of action.

Almost all cars retaining the chain drive that are exhibited have well designed oil tight chain cases, a feature which at once removes the greatest objection to this form of drive.

In the rear axle itself the straight tooth or spur differential shows an increase in use, so that the bevel wheel thus tends to disappear from motor car practice altogether.

But little change is apparent in frame design, which still adheres to the pressed steel form. What alteration has been made is in the direction of lowering the height at the rear so as to accommodate the covered body, which increases greatly in popularity each year.

As a concluding feature, the popularity of the wire wheel on all types of car must be recorded. The wire wheel has always had several firm supporters, of which the Lanchester, that origin of so many new ideas, was perhaps the most prominent. Two years ago, however, the Rudge Whitworth detachable wire wheel opened up a new range and since then this more mechanical device has spread to an extent that may be judged from the fact that such firms as Daimler and Napier, along with a dozen others fit Rudge-Whitworth detachable wheels as standard on all models. It certainly requires some time before the eye becomes accustomed to the wire wheel, but once the novelty has worn off, its many advantages, including those of lightness and strength, greatly favor its general use.

With the known falling off in the demand for the larger powered cars and the big increase of competition in the smaller section, it was generally anticipated by the public that a general drop in prices would be manifested. This has not been the case and although in certain instances prices are slightly below those of last season, the usual rule seems to have been to improve the details and so to keep the price up to its former level. By the introduction of new low-powered models, however, many of the biggest makers—such as Napier, Austin, Delaunay, Fiat—have now brought their productions within the reach of that immense section of the community, "the man of moderate means."

These small cars differ only in size and in detail finish from their bigger companions and the high class quality of work has been retained to a big extent, so that a wide and excellent range is available for the choice of the purchaser.

A walk around the stands with an outside examination of the better known cars shows how completely the design of the higher powered vehicles has settled down to broad standard lines. There are, it is true, several notable exceptions, such as the new valveless Daimler and the gear-boxless Sheffield-Simplex—though here again the exception is only in respect to one unit of the car—but with all others a description of one might be applied equally well to half a dozen others.

Some of the British Cars at the Show.

For most visitors the first stand to be inspected will probably be that of the Daimler Company, which, by a curious coincidence, occupies the center position of the building. When two months ago the Daimler Company announced their intention of adopting the Knight valveless engine exclusively for the coming season, there was much criticism of their action, many believing that the firm had been too precipitate in deciding to concentrate on these engines right away. Mr. Knight's descriptive paper before the Royal Automobile Club a few weeks ago and the publication of the results of extensive tests that have been made, have led most people to believe that this engine marks the commencement of a new era in motor construction—for in addition to demonstrating the advantages which such an engine offers for the four-cycle motor, the new engine has directed public attention to the possibilities of the two-stroke motor, to which class the Knight engine was at first erroneously supposed to belong.

Four models of Daimler cars are being shown, the 22-horsepower, 38-horsepower, 48-horsepower and 57-horsepower. All are of the new type, and, with the exception of the last, have four cylinders. The 57-horsepower six-cylinder car is stated to have been constructed primarily to fulfil a special order for the United States.

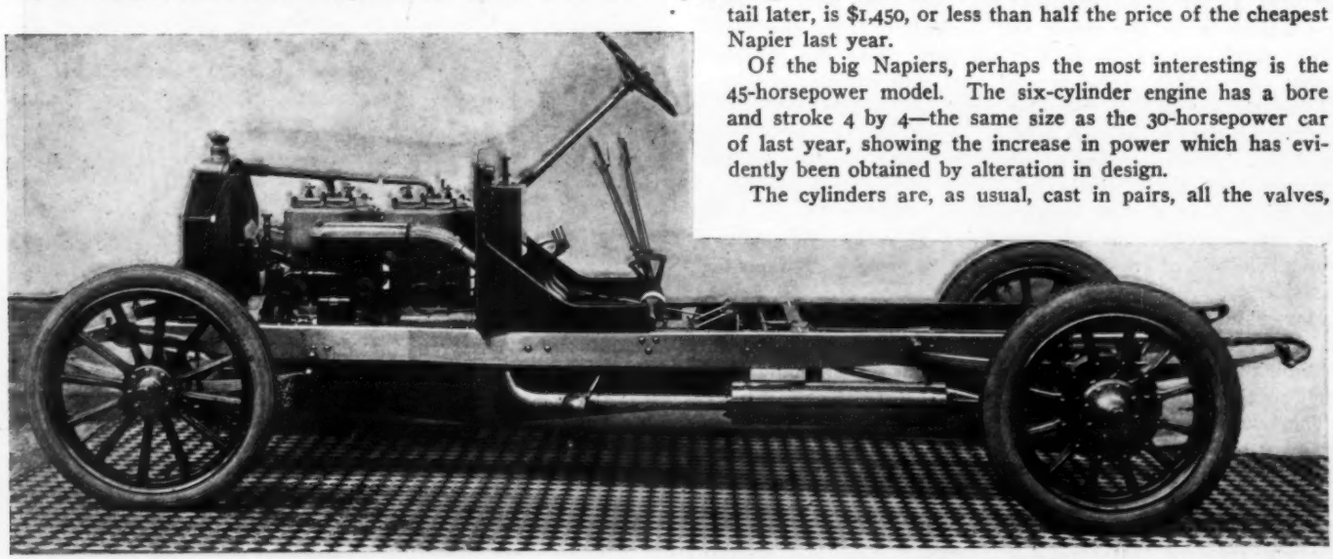
Once such staunch supporters of the chain, the Daimler Company have now abandoned this drive on all cars, except the 48-horsepower model, shaft drive with bevel gearing being employed.

The pressed steel side frame members are parallel throughout and are connected by tubular cross members. Rudge-Whitworth wire wheels are fitted as standard on all models, but wooden artillery wheels will be substituted if the purchaser desires. The chassis prices of these cars range from $2,375 for the 22-horsepower to $4,000 for the 57-horsepower.

On the adjoining Napier stand much of novelty is likewise to be seen, though here there is not so much a radical alteration in design as the provision of new models in a section hitherto untouched by this maker. Always associated with the high-class six-cylinder car, the Napier name still applies to the several models of this type that are staged, varing in power from 30 to 90-horsepower. But, in addition to these, the popular 15-horsepower four-cylinder car attracts general attention, and also the 10-horsepower two-cylinder light car. The price of this last, possessing many features of interest which will be noted in detail later, is $1,450, or less than half the price of the cheapest Napier last year.

Of the big Napiers, perhaps the most interesting is the 45-horsepower model. The six-cylinder engine has a bore and stroke 4 by 4—the same size as the 30-horsepower car of last year, showing the increase in power which has evidently been obtained by alteration in design.

The cylinders are, as usual, cast in pairs, all the valves,



Effective and Solid Construction of the Chassis of the 45-60-horsepower Four-cylinder Opel.

which are interchangeable, being operated by the one camshaft. This in its turn is driven by helical gearing to reduce the noise. The general elimination of noise of details in this way has led to the adoption of "Noiseless Napier" as the title of the cars for next season.

The system of forced lubrication to every working part is the same as was used on last year's cars, and as any excess is taken from the well by the pump and restored to the tank, it would seem impossible for the engine to give trouble by smoking. The chrome-nickel crankshaft, with disc webs, runs in plain bearings. The comparatively small flywheel carries the flat disc clutch and between this and the gear-box two separate Hooke's joints are interposed to insure absence of any binding due to momentary frame distortion.

The gear-box has three forward speeds and reverse, the lay-shaft and reverse pinion being at rest when top gear is engaged. The gear shafts are unusually large in diameter and as short in length as possible, and these factors, together with the intermediate ball bearing for each shaft, prevent any humming of the gears, which the firm contends is due in general to springing of the shafts. The gears themselves slide on feathers solid with the shaft, instead of being on a squared shaft as formerly.

Behind the gear-box the foot brake is combined with a ratchet sprag—a device now rarely met with—and this is linked up to the reverse lever to prevent any possibility of accident. In the rear live axle the two internal shafts have the driving gears integral with them, the differential gears being of the straight tooth type.

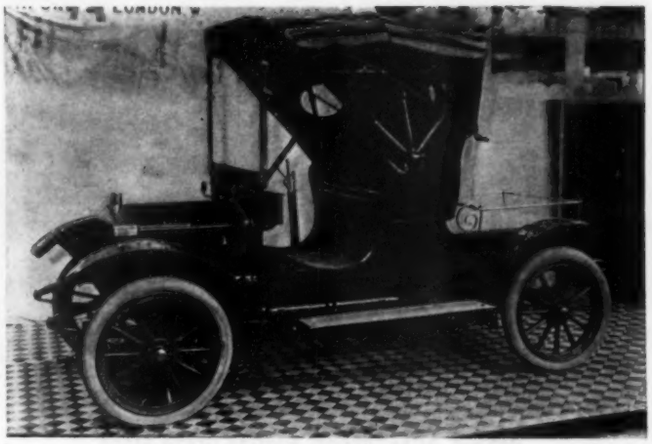
The 30-horsepower model is the third of the series which includes the 10 and 15-horsepower cars. The cylinders, cast in pairs, have bore of 3¼ inches and stroke of 5 inches. The valves are all enclosed.* The remaining features are the same as those of last year's 30-horsepower car, with, however, the difference that a general lightening of parts has reduced the weight by no less than five hundredweight.

The 60-horsepower car is a bigger edition of the 45-horsepower having cylinders 5 by 5, while the 90 horsepower model, cylinders 6 by 5, is apparently a touring edition of the Grand Prix races, which were built for that contest but which never competed, owing to the barring of wire wheels by the French club. These wire wheels are standard on all Napier cars for 1909.

Further on, the Sheffield-Simplex is an example of several similar high class six-cylinder cars, but in itself it is remarkable in that it has no gear-box—in the usual sense of the word. The six-cylinder engine has its 4½ by 4½ cylinders cast in pairs, and the crankshaft is built in three pieces bolted together, a method of construction necessitated by the use of ball bearings. These bearings are of very big dimensions, ⅞-inch balls being used. Dual ignition is fitted, and the wires are in the form of a built-up cable with separate short leads to the plugs. The engine control is effected by a foot throttle pedal, sliding sideways. The movement is quite free, and as no pressure is required to keep the pedal in any particular position, great steadiness of running can be secured on the roughest of roads. The other foot pedal operates the clutch, and then, after a short neutral travel, the shaft brake. From the disc clutch the power is transmitted through a double universal joint to the real axle casing. Here, before the bevel pinion is reached, a short lay shaft is provided, which, in very compact form provides a low gear and a reverse. It is claimed that this low gear is never required, except for starting on the steepest of hills. The absence of the gear-box certainly improves the chassis, which presents a strikingly simplified appearance to the eye. Two views of the chassis are shown on page 732 of this issue THE AUTOMOBILE.

On many other stands British cars of known worth are staged, but as in most of these cases smaller models are manufactured with special details, consideration of these exhibits will be deferred till later.

*The disc clutch on this model is placed within the gear-box, which latter is also extended to cover the foot brake.



The Two-seated Victoria Made by Alldays.

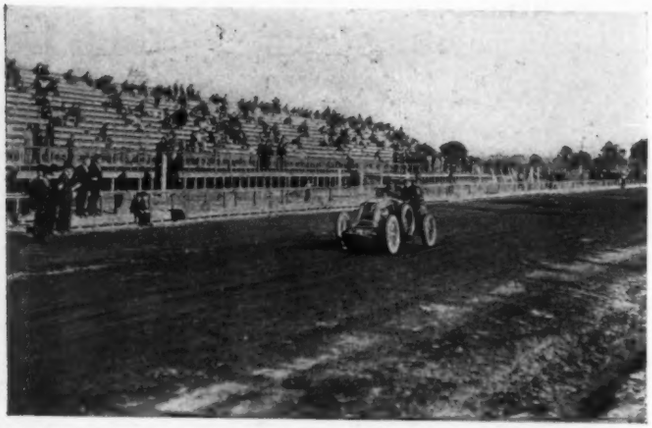
Some Distinctive Features of the American Exhibits.

The American firms that have established agencies over here are well represented at the show. In many cases the standard models have been slightly departed from to fall in more fully with British ideas, and agents are confident that the coming season holds out good business prospects for them. The White stand is always a center of attraction, for these cars are well known to British motorists and have quite a notable list of patrons. Rollin White was busy all day explaining numerous special points of interest of the new models, both the 15 and 40-horsepower types being shown. The many departures from previous White practice give additional interest. The frame is of pressed steel and the two forward cross members carry the engine, the weight of which thus comes behind the front axle. The short ball bearing crankshaft and the adoption of Joy's valve gear are further points of interest, and, altogether, the new Whites are certain to cause a big increase in the numbers of steam car owners over here.

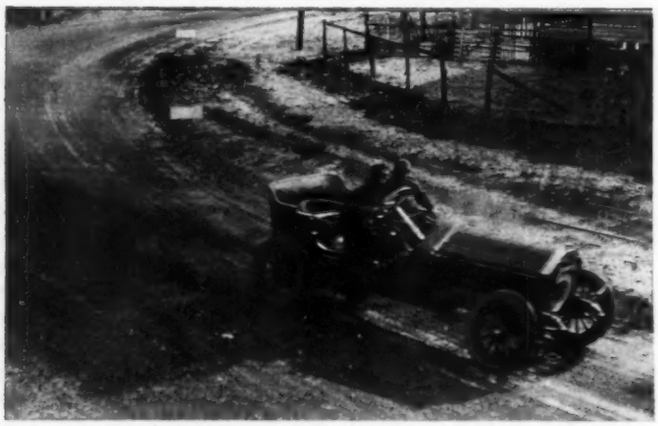
Another American exhibit to which much attention is being paid is that of the Cadillac cars. The name Cadillac has always been associated with the well-known single-cylinder vehicle which has behind it such an unvarying list of successes in reliability competitions, ending up with the famous standardization tests of this spring. Hence unusual interest is shown in the new 26-30-horsepower four-cylinder model which has just arrived. The spun brass jackets on the separate 4 by 4½ cylinders are noteworthy, as also are the separate combustion heads—a practice which in these days of accurate machinery might well be re-introduced generally. The circulation of the oil from one crank pit to the next is very ingenious and should prevent any fouling of the rear cylinders when hill climbing. The engine is ungoverned, but control is easily effected by the provision of both foot and hand throttles, as well as an interconnection of clutch pedal and throttle to prevent any racing of the engine when gear changing. A similar interlocking arrangement prevents the clutch engaging till the gears are fully in mesh, a point which should reassure the novice. Taking the car right through, the general design and workmanship are such as to reflect great credit on the Cadillac firm, and a good seaosn might safely be predicted for it.

The popular Ford cars are shown both in the 15-18 four-cylinder type, which is practically unaltered from last year, and in the new and distinct 2024 horsepower. Like the British Deasy mentioned before, the cylinders of the new Ford are cast in one block integral with the top half of the crankcase. The enclosed flywheel and epicyclic gears, all running in oil, are points of special note. The low tension magneto, combined with the fly wheel is also a novelty and should give a powerful spark and efficient firing at low speeds.

Many American firms—Rushmore, Goodrich, Stewart & Clark, Jones, and others—are to be found in the accessory section.



Renault, Szisz Driving, Passing Grand Stand.



Haupt in Chadwick, at the Thunderbolt Curve.

Seymour and Simplex Taking Thunderbolt Curve.

National, with Harding at Wheel, Rounding Curve.

ALL READY FOR SAVANNAH RACES.

SAVANNAH, GA., Nov. 23.—As the day of the great race draws nearer Savannah is giving itself up more wholly than ever to the celebration of this, the greatest event in her modern history. The business section of the city is hung with Automobile Club of America colors, and most of the cars about town bear the club's bannerettes. Savannah's whole heart is in this race, and no one would so abuse hospitality as to intimate that the coming contest is not to be the greatest ever run in this or any other country.

Savannahians have above all an ambition that Thursday will see a new world's record set up. It is hard to convince them that with nineteen right-angle turns on the course, with several stretches of pretty rough going for racing cars, and the stops necessary for tire changes and fuel replenishment in so long a contest as 400 miles, it is unreasonable to expect an average rate as fast as 70 miles per hour.

There has been a lengthening of the course some eight miles, some curves have been softened, and turns have been banked. The magnificent 3½-mile Ferguson avenue stretch has been added, which will admit of unlimited speed, but after all there remains but this and the homestretch as the only portions available for any continued high speed. Single laps have been made at 70 miles an hour rate, but it is not to be expected that this should be maintained. If the Locomobile's Vanderbilt course average of 64.3 miles be beaten, the Savannahians should be well satisfied.

The banking of the turns has been a disappointment to the foreign drivers for two reasons. In the first place they are accustomed to skid around turns, and again the turns rise at the start and slope at the finish. The drivers say that this should have been reversed. It is also suggested that objection to any figures made standing as a road record may be made on the ground of the route being thus a specially prepared course, whereon actual road conditions are not encountered.

The Savannahians have spared no expense and left no stone unturned to improve on their excellent arrangements and management of last Spring. They have built a new and larger press stand, and erected west of the old stand a new stand with a seating capacity of ten thousand. The capacity of the old stand was also increased to 6,000. Eleven telephone stations have been established, connected with the score boards facing the grandstands and parking spaces. Along the front of the old stand, which is really the grandstand, the new stand being in the bleacher class, supply pits have been dug. Another supply station has been established at the head of Ferguson avenue, which is solely for tire supplies.

The troops have been ordered on duty by the adjutant-general. They number 500 and will be in command of Major W. P. Stephens. The course will be patrolled by 134 flagmen. One hundred and fifty men are at work on the course every day.

A great crowd is expected from neighboring States and cities. All the southern railroads have been selling excursion tickets with coupons attached, good for a seat on the new stand and exchangeable at one dollar on account of grandstand seats, which are sold for $3 for the two days. No single day grandstand seats are sold. Boxes seating six sell for $50. The Northerners have chosen the west end of the stand.

Chatham county has borne the expense of building the new roads, and the City of Savannah has resurfaced the roads within the city limits. The Savannah Automobile Club erected the grandstands and telephone line and will pay the flagmen. The profits of the race will go to the advertising fund of the city. The Automobile Club of America will not receive any of the race receipts, though at different times it is reported to have received appropriations amounting to $7,000 toward the cash prizes and other purposes. All other expenses attendant on the conduct of the race itself, relating to publicity and the contest committee and the cost of the $5,000 Gold Cup, are borne by the New York club.

Two serious accidents have marked the preliminary practice, one fatal and the other also possibly with death as its outcome. On Friday as the S. P. O. was speeding up the White Bluff road, John Juhasz, its driver, in trying to avoid a dog, swerved to the side of the road, gouged a big piece out of a tree, and then dashed into a telegraph pole. The crew was hurled from the car. Marcus De Rosa, the mechanic, had a fractured skull and other injuries and died shortly after reaching the hospital. Juhasz escaped with bruises. The car was not, however, hopelessly wrecked. It is now at a repair shop with hopes of its still being able to take part in the light car race with either Phil. Adams or Connors, who was Stricker's mechanic in the Vanderbilt race, as its driver.

The other accident occurred in front of the Buick camp during Wednesday's practice. Robert Burman was driving a light Buick, when its left rear tire blew out. The car skidded into a telegraph pole and was completely wrecked. The mechanic, Joe Grinnan, had his skull, elbow, and six ribs broken. One rib punctured his lung and pneumonia has set it. Burman escaped without injury.

All hands, both European and American, are well equipped in the matter of camps. All the foreign training quarters are located at points along the course. Three of the Americans have suburban establishments, the others making their headquarters at the local garages, where they have adequate shop facilities already at hand, the Acme and the Lozier having the most pretentious outfits, and the Buick having a shop alone by the trackside.

The Acme occupies the same quarters at Bonabella on La Roche avenue as it did last spring. A commodious cottage belonging to Robert Saussy lodges the camp captains and crews. A big boathouse by the riverside has been turned into a shop and garage. The commander of the camp is C. H. Tucker, sales manager of the company. With him are Frank Clemmer, engineer; Ed. Lengel, head tester, and "Doc" Harry Frieburg, mechanic. Len Zengle, driver, and Charley Gross and Moses Saxon complete the force. The Acme stock car racer, a seven-passenger touring car, and a runabout are the artillery force outside of the Grand Prize racer itself.

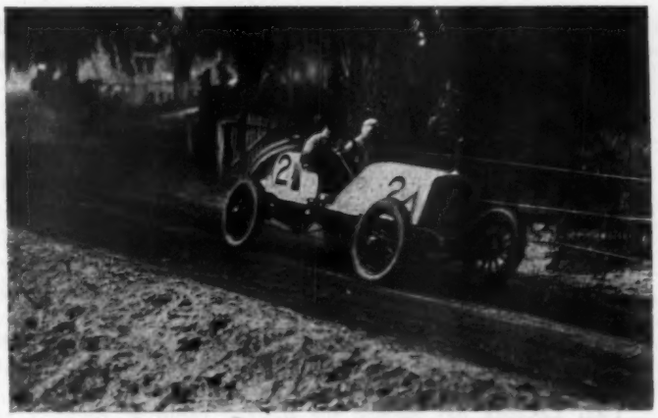
Prior's Woodlawn Villa, quite a pretentious estate on the White Bluff road, has been leased outright by Harry Lozier. A barn has been converted into a shop. C. A. Emise, sales manager, who is in command, has Mrs. Emise and two children with him. Harry Michener, driver, Ralph Mulford, substitute, and Tom Lynch, mechanic, are noteworthy members of the force. Mr. Turcott is here from the Plattsburg factory in charge of the mechanical force. In addition to the new racer, a Briarcliff model touring car is available for studying the course.

W. L. Marr, designer, has pitched the Buick camp a half mile out the White Bluff road. A building fully equipped as a shop and garage has been erected. John Hancock, superintendent of the factory, is with him. Ten mechanics are under their orders, in addition to Robert Burman, Ewing Easter, and Earl Jeffers, the drivers. C. A. Hearne, who is to drive his own car, also has his mechanic at the camp.

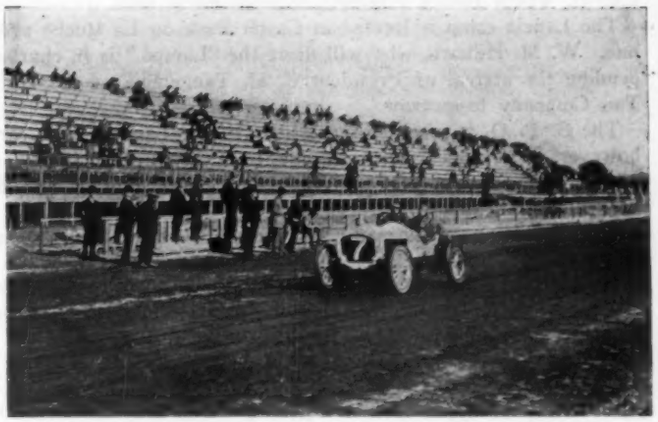
The Simplex is stored at the Southern Automobile Company's garage, across the street from the De Sota. Joseph Seymour, the driver, and T. M. Pepperday, his mechanic, are in full charge.

Carl W. Kelsey, sales manager, has leased a shop at 214 East Broughton street. Three mechanics from the factory will also serve in that capacity for Arthur See, Joseph Munweller, Thomas Costello, and Mr. Kelsey himself, who will be the pilots of the Maxwell "mosquito fleet." The fourth mechanic will be a local man. Mr. Kelsey maintains military discipline, heading the procession to and from the course. He also insists that each man walk for an hour before breakfast to assure his physical condition.

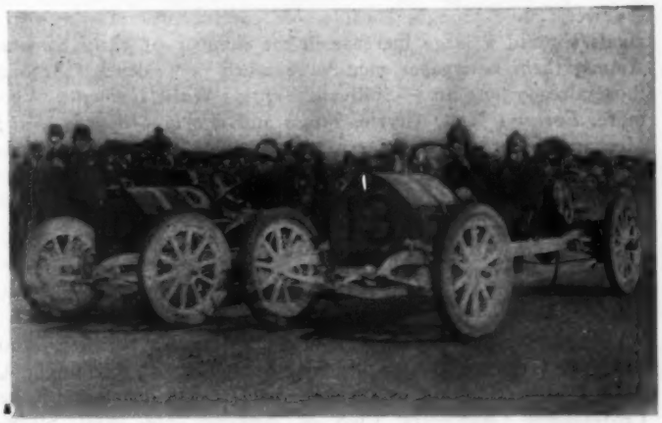
The Chalmers-Detroit light car outfit has established its headquarters at Bryam's garage, in command of G. G. Behn, assistant



Michener in Lozier on Course at Isle of Hope.



Zengle Takes His Acme Past the Big Grand Stand.



Two Chalmers Detroit Candidates for Small Car Race.

Lancia "Lampo" with Driver Hilliard at the Wheel.

chief engineer. Lee Councilman, sales manager, is also on hand. Mr. Ford, the new advertising manager, and Carl H. Page, New York agent, are expected to-morrow. L. B. Lorimer and W. R. Burns have had out No. 10 and No. 13 each day for practice. L. J. Bergdoll, the Philadelphia agent, is still awaiting his car.

President A. C. Newby, of the National Motor Vehicle Company, has his six-cylinder at the Graham Automobile Company's garage, next door to the Pulaski. W. G. Wall, chief engineer, arrived to-day to take charge. G. A. Weideley, designer of the Premier, and Carl Fisher, of Indianapolis, came with him. Hugh N. Harding, who drives the car, is much in evidence.

F. T. Cameron did not arrive with the Cameron until last night. The committee received a telegram to-day, stating that the American Aristocrat would not be here to start.

Paul LaCroix has pitched the Renault camp at Barbee's at the Isle of Hope. The Italas are at Mrs. Hires' in the same district, where Henry Fournier receives many calls.

The Lancia camp is located at Castle Park on La Roche avenue. W. M. Hilliard, who will drive the "Lampo," is in charge, pending the arrival of President C. H. Tangeman, of the Hol-Tan Company to-morrow.

The S. P. O. is next door neighbor to the Lancia. The car, however, is now at Byram's garage, being repaired in the hope of its being able to start on Wednesday, with Paul Adams as its driver.

The Benz is at the German Club, and the Clement, De Dietrich, and Fiat at Thunderbolt.

Willie Haupt and the Chadwick are quartered at Police Headquarters. L. S. Chadwick, president, and H. B. Larzelere, sales manager, of the Chadwick Engineering Works, are in charge.

Heavy Attendance of Trade and Press.

Indications point to a large attendance of men prominently connected with the sport and industry, despite the remoteness of the week of the race. The trains and steamers all during the week have brought considerable contingents. To-day's arrivals showed a large increase in the number of early comers. Among them newspaper men were much in evidence. Among those already here are: Sullivan, *Herald;* Wolff, *Tribune;* Wetmore, *Evening Mail;* Gerrie, *Times* and *World;* Johnson, *Sun;* Meegan, *Telegraph;* and Curry, *American,* of New York; Kerrison, *American;* Reynolds, *Post,* and McNamara, *Herald,* of Boston; White, *Evening Times,* of Philadelphia, and Small, *Associated Press.*

Some of the tradesmen on hand are: William Du Cros, Dunlop Tire Company, London; J. C. Matlack and J. Wilbur Hobbs, Michelin Tire Company; J. C. Cockran, Continental Caoutchouc Company; S. H. Jacobs, Pennsylvania Rubber Company; George A. Weideley, Premier Mfg. Co.; C. A. Emise, Lozier Motor Company; Arthur Gruner, Chicago; Carl Fisher, Prest-O-Lite Company; L. S. Chadwick and H. B. Larzelere, Chadwick Engineering Works; Lee Councilman, Chalmers-Detroit Company; A. C. Newby, National Motor Vehicle Company, and C. W. Kelsey, Maxwell-Briscoe Motor Company.

Who the Starters Are, and the Weights Carried.

The following is a list of the starters in both races with the drivers, mechanics, and weights of the cars:

GRAND PRIZE RACE.

No.	Car.	Driver.	Mechanic.	Weight in Pounds.
1.	Clement-Bayard	Victor Rigal	Charles Gilbert	2775
2.	Lozier	Harry Michener	Tom Lynch	3075
3.	Simplex	M. J. Seymour	Tom Pepperday	3325
4.	Buick	Robert Burman		2700
5.	Chadwick	Willie Haupt	F. G. Bremer	2950
6.	Fiat	Felice Nazarro	F. Tagnano	2750
7.	Acme	Leonard Zengle	H. W. Freiberg	2500
8.	Benz	Victor Hemery	Gill	2925
9.	Lorraine-Dietrich	Arthur Duray	Matthys	2875
10.	Renault	Francois Szisz	Martand	2525
11.	National	Hugh N. Harding	C. S. Kellum	2750
12.	Itala	Alexandre Cagno	Moriondo	3150
13.	Clement-Bayard	Hucian Hautvast	Chassangne	2700
14.	Fiat	Louis Wagner	Ferro	2750
15.	Benz	Rene Hanriot	Heim	2925
16.	Renault	Louis Strang	C. Anderson	2550
17.	Itala	Henry Fournier	Riva	3275
18.	Fiat	Ralph DePalma	Bordino	2775
19.	Benz	Fritz Erle		2875
20.	Itala	Giovanni Piacenza	Cosso	3300

SMALL CAR RACE.

No.	Car.	Driver.	Mechanic.	Weight in Pounds.
1.	S. P. O.	Herbert S. Conners		1984
2.	Lancia	W. M. Hilliard	Frank Strobel	2000
3.	Chalmers-Detroit	L. J. Bergdoll	Charles Howard	1900
4.	American Aristocrat	K. R. Manville		
5.	Cameron	F. I. Cameron	J. J. White	1125
6.	Isotta	Al. Poole	W. Fehr	1500
7.	Gregoire	George Robertson	Glen Ethridge	1500
8.	Buick	R. Burman		1500
9.	Maxwell	A. See	Carter	1525
10.	Chalmers-Detroit	L. B. Lorimer	J. H. Stickney	1900
11.	Buick	E. A. Hearne	J. Tower	1475
12.	Maxwell	T. Costello	J. R. Cleland	1175
13.	Chalmers-Detroit	W. R. Barns	R. R. Gareau	1900
14.	Buick	E. Easter	F. A. Thompson	1500
15.	Maxwell	J. Munweiler	Michelson	1125
16.	Buick	Earl Jeffers	W. C. Mahoney	1550
17.	Maxwell	Carl W. Kesley	H. Cawood	1450

STRICKER LAID AT REST IN NEWARK.

Funeral services over the remains of Emile Stricker, who was killed during the twenty-four-hour race at Birmingham, Ala., Tuesday, November 17, were held at the quarters of the Professional Chauffeurs' Club of America, 158 West Sixty-fifth street, New York City, at ten o'clock Friday morning. The body was taken to Newark, N. J., in the afternoon and placed in the receiving vault in Fairmount cemetery, to await further instructions from abroad. Prior to the services a special meeting of the Chauffeurs' Club, of which Stricker was a charter member, was held and the following resolutions on his death were passed:

Whereas, Our beloved brother, Emile Stricker, has been suddenly removed from our midst by the divine hand of Providence, to the great sorrow of his relatives, many friends and fellow club members; be it

Resolved, That we, the members of the Professional Chauffeurs Club of America, tender our sincere sympathy to the bereaved family of the deceased and hereby express our deep appreciation of his sterling qualities and marked ability, and regret the personal loss which each member of this club has sustained by the death of our friend and fellow member; and be it further

Resolved, That these resolutions be printed in the official organ of this club, the "American Chauffeur," and that copies of the resolutions be sent to the family of the deceased, also spread upon the minutes of this club.

GOOD ROADS MEN MEET IN INDIANA.

INDIANAPOLIS, IND., Nov. 23.—Advocates of good roads from all parts of the State will meet here to-morrow night for the purpose of organizing the Indiana Bureau of Good Roads into a permanent association. The meeting will be presided over by R. A. Brown, temporary chairman, until officers are elected.

The meeting will be held in the assembly room of the Board of Trade building, and it is expected that automobile owners, farmers, rural mail carriers and others interested in good roads, will attend. There will be addresses by W. G. Blatchley, State geologist; W. H. Roberts and John Mendenhall, county commissioners, and Clarence Kenyon, who made a special study of highway construction in Europe during the last summer.

The bureau believes that a better system governing road construction should be adopted. To this end it will ask the Legislature to create a State Highway Commission.

At this time road building is accomplished by very unsatisfactory methods, without regard for the season when it should be done. Farmers are authorized to haul gravel on the roads at $3 a day, the amount being allowed on their taxes. As a result they haul gravel when they have nothing else to do and merely dump it in the middle of the road.

It is probable the Legislature will be asked to give the highway commission a liberal appropriation to carry on the work.

BENEFITS DERIVED BY HEAT TREATING STEEL

By THOMAS J. FAY, President Society of Automobile Engineers.

THE latter day practices of the makers of automobiles take into account, primarily, material soft enough to be worked on a commercial basis. Since the materials have to serve for divers purposes, they have to be rendered hard or dynamic and in other states, depending upon the service. It is possible to start in with certain selected grades of steel, initially soft, but susceptible of transformation, if heat treatment is resorted to. In this article an attempt will be made to expose to view some of the methods by which initially good steel may be readily fashioned into shape and thereafter rendered hard or soft, ductile or dynamic, as the exigencies of the service may demand.

THE RANGE OF TEMPERATURES FOR THE SEVERAL TREATMENTS OF STEEL.

No.	Description.	Quench. Temp. deg. C.	Anneal. Temp. deg. C.	Quench. media.	Anneal. media.
A.	Annealing		350	Lime	
B.	Annealing		750	Lime	
C.	Annealing		800	Lime	
D.	Annealing		850	Lime	
E.	Annealing		900	Lime	
F.	Annealing		950	Lime	
G.	Annealing		1,000	Lime	
H.	Annealing		1,050	Lime	
I.	Annealing		1,100	Lime	
J.	Cementing and Tempering.	800	250	Water	Bismuth
K.	Cementing and Tempering.	850	250	Water	Bismuth
L.	Cementing and Tempering.	900	250	Water	Bismuth
M.	Cementing and Tempering.	950	250	Water	Bismuth
N.	Cementing and Tempering.	800	300	Water	Lead
O.	Cementing and Tempering.	850	300	Water	Lead
P.	Cementing and Tempering.	900	300	Water	Lead
Q.	Cementing and Tempering.	950	300	Water	Lead
R.	Hardening	750		Water	
S.	Hardening	800		Water	
T.	Hardening	850		Water	
U.	Hardening	900		Water	
V.	Hardening	950		Water	
W.	Hardening	1,000		Water	
X.	Hardening	1,050		Water	
Y.	Hardening	1,100		Water	
Z.	Hardening	750		Oil	
AA.	Hardening	800		Oil	
AB.	Hardening	850		Oil	
AC.	Hardening	900		Oil	
AD.	Hardening	950		Oil	
AE.	Hardening	1,000		Oil	
AF.	Hardening	1,050		Oil	
AG.	Hardening	1,100		Oil	
AH.	Hardening and Tempering.	750	250	Water	Bismuth
AI.	Hardening and Tempering.	800	250	Water	Bismuth
AJ.	Hardening and Tempering.	850	250	Water	Bismuth
AK.	Hardening and Tempering.	900	250	Water	Bismuth
AL.	Hardening and Tempering.	950	250	Water	Bismuth
AM.	Hardening and Tempering.	1,000	250	Water	Bismuth
AN.	Hardening and Tempering.	1,050	250	Water	Bismuth
AO.	Hardening and Tempering.	1,100	250	Water	Bismuth
AP.	Hardening and Tempering.	750	250	Oil	Bismuth
AQ.	Hardening and Tempering.	800	250	Oil	Bismuth
AR.	Hardening and Tempering.	850	250	Oil	Bismuth
AS.	Hardening and Tempering.	900	250	Oil	Bismuth
AT.	Hardening and Tempering.	950	250	Oil	Bismuth
AU.	Hardening and Tempering.	1,000	250	Oil	Bismuth
AV.	Hardening and Tempering.	1,050	250	Oil	Bismuth
AW.	Hardening and Tempering.	1,100	250	Oil	Bismuth
AX.	Hardening and Tempering.	750	300	Oil	Lead
AY.	Hardening and Tempering.	800	300	Oil	Lead
AZ.	Hardening and Tempering.	850	300	Oil	Lead
BA.	Hardening and Tempering.	900	300	Oil	Lead
BB.	Hardening and Tempering.	950	300	Oil	Lead
BC.	Hardening and Tempering.	1,000	300	Oil	Lead
BD.	Hardening and Tempering.	1,050	300	Oil	Lead
BE.	Hardening and Tempering.	1,100	300	Oil	Lead
BF.	Hardening and Tempering.	750	350	Oil	Oil
BG.	Hardening and Tempering.	800	350	Oil	Oil
BH.	Hardening and Tempering.	850	350	Oil	Oil
BI.	Hardening and Tempering.	900	350	Oil	Oil
BJ.	Hardening and Tempering.	950	350	Oil	Oil
BK.	Hardening and Tempering.	1,000	350	Oil	Oil
BL.	Hardening and Tempering.	1,050	350	Oil	Oil
BM.	Hardening and Tempering.	1,000	350	Oil	Oil
BN.	Hardening and Tempering.	750	550	Oil	Salts
BO.	Hardening and Tempering.	800	550	Oil	Salts
BP.	Hardening and Tempering.	850	550	Oil	Salts
BQ.	Hardening and Tempering.	900	550	Oil	Salts
BR.	Hardening and Tempering.	950	550	Oil	Salts
BS.	Hardening and Tempering.	1,000	550	Oil	Salts
BT.	Hardening and Tempering.	1,050	550	Oil	Salts
BU.	Hardening and Tempering.	1,100	550	Oil	Salts
BV.	Hardening and Tempering.	750	300	Water	Lead
BW.	Hardening and Tempering.	800	300	Water	Lead
BX.	Hardening and Tempering.	850	300	Water	Lead
BY.	Hardening and Tempering.	900	300	Water	Lead
BZ.	Hardening and Tempering.	950	300	Water	Lead
CA.	Hardening and Tempering.	1,000	300	Water	Lead
CB.	Hardening and Tempering.	1,050	300	Water	Lead
CC.	Hardening and Tempering.	1,100	300	Water	Lead
CD.	Hardening and Tempering.	750	350	Water	Oil
CE.	Hardening and Tempering.	800	350	Water	Oil
CF.	Hardening and Tempering.	850	350	Water	Oil
CG.	Hardening and Tempering.	900	350	Water	Oil
CH.	Hardening and Tempering.	950	350	Water	Oil
CI.	Hardening and Tempering.	1,000	350	Water	Oil
CJ.	Hardening and Tempering.	1,050	350	Water	Oil
CK.	Hardening and Tempering.	1,100	350	Water	Oil
CL.	Hardening and Tempering.	750	550	Water	Salts
CM.	Hardening and Tempering.	800	550	Water	Salts
CN.	Hardening and Tempering.	850	550	Water	Salts
CO.	Hardening and Tempering.	900	550	Water	Salts
CP.	Hardening and Tempering.	950	550	Water	Salts
CQ.	Hardening and Tempering.	1,000	550	Water	Salts
CR.	Hardening and Tempering.	1,050	550	Water	Salts
CS.	Hardening and Tempering.	1,100	550	Water	Salts
CT.	Hardening and Tempering.	750	650	Water	Salts
CU.	Hardening and Tempering.	800	650	Water	Salts
CV.	Hardening and Tempering.	850	650	Water	Salts
CW.	Hardening and Tempering.	900	650	Water	Salts
CX.	Hardening and Tempering.	950	650	Water	Salts
CY.	Hardening and Tempering.	1,000	650	Water	Salts
CZ.	Hardening and Tempering.	1,050	650	Water	Salts
DA.	Hardening and Tempering.	1,100	650	Water	Salts

There are dozens of detailed ways of heat-treating steel, but the principal remains the same in all, differing perhaps as respects temperature and time, calling into play the influences of quenching baths, and the effect of varying rates of time, in heating and quenching. The above tabulation will suggest some of the variations, and it may serve to indicate the desirability for system and a well-defined uniformity in practice.

It is not claimed that all the "heat treatments" given in the tabulation will be found valuable for use; on the other hand, the contrary will be found true. It is the idea to afford a wide range of specific forms of heat treatment, and in so far as it is possible to do so, extend proof of the value or otherwise of the several modes of treatment.

It will be understood the treatment proper for one grade of steel would be fatal for another. It follows that there may be grades of steel demanding some one of all the formulæ given under some one of the several likely conditions. It is better to afford a diversity of formula, rather than to restrict the same, merely to court brevity. The table in question, in itself, offers no suggestion of the exact treatment to use in any given case nor does the same table include every possible treatment.

The table, together with some data on the subject, should, however, materially aid in the process. It is by far better to be able to identify the respective modes of procedure in some way, than to go about it haphazard. As regards the steel itself, there are several points that can be taken as more or less fixed, viz.:

(1) Steel for "cementing" (case hardening) may be alloyed or not, but it should be low in carbon. If the same is alloyed, the carbon should be lower than if the steel were of the carbon-steel genus.

(2) Iron almost devoid of carbon may be case-hardened (cemented), but the time required to grow a depth of carbon will, of course, be comparatively great in iron or in mild steel.

It will be to no purpose to attempt to improve upon the language of "Harboard"* in his definition of "tempering," viz., "The hardness conferred upon steel by rapid quenching is not suitable for any industrial purpose, and has to be modified or 'tempered' to suit the particular requirements of the case. This may be done by reheating the hardened (quenched) steel to different temperatures. The operation of tempering may therefore be defined as modifying the degree of hardness conferred upon steel by quenching, by heating to certain definite temperatures, and slowly or rapidly cooling. Tempering reduces the brittleness and the hardness and considerably increases the toughness and ductility of the materials, and by varying the conditions of heat treatment almost any required degree of hardness may be produced."

In annealing steel it will be well to remember that the process will be most beneficial as a rule if the steel is heated to a point above Ar_1 by a margin of about 30 degrees C. In some grades, a matter depending upon the carbon content.

*Harboard: The Metallurgy of Steel, p. 641, Sec. Ed.

Cementing steel is also a product singularly free from impurities when the results are noteworthy.* Krupp cementing steel, for illustration, rarely has more than ten points of carbon, no matter what the other components may be. This is provided the steel is for "cementing." In this steel the sulphur and phosphorus are both held very low, indeed, and the manganese does not exceed 0.50 per cent. What is meant by low sulphur and phosphorus is something to define in view of the great diversity of opinion of this phase of the subject.

Sulphur Limitations (in automobile work):

0.010 = a very satisfactory low limit;
0.015 = a moderately satisfactory point;
0.020 = the top limit for capital results.

Phosphorus Limitations (in automobile work):

0.010 = a very satisfactory low limit;
0.015 = a moderately satisfactory point;
0.020 = the top limit for capital results.

It is not impossible to use steel if the sulphur and phosphorus are in excess of the top limits given, but the idea here is to fix the range of desirable contents. In heat-treated steel there are many things to conspire against the user of inferior steel, and the chances of ill results are so great as to demand the use of none but the finer grades of steel.

The silicon should, in most cases, be low as well; in fine, it seems, the nearest approach to pure iron plus the alloying elements, would best serve the purpose. Then the carbonizing process may be conducted under conditions of the greatest possible safety and the "failures" will be few and far between. The usual object in cementing is to attain extraordinary results, hence it would seem as if the steel should be of extraordinary quality. Indeed, it is true of steel that the "metalloids"† should be as low as possible anyway, whether the steel is for case-hardening or not. If steel is not to be "cemented" and it is desired to render the same hard by quenching, the carbon must then be higher (than that in cementing steel) by a considerable amount. In carbon steel, it is true, that if the carbon is below 20 points, there will be no appreciable increase in hardness as the result of quenching from even very high temperatures. Obviously, then, the carbon must be above 20 points if the hardness is to be due to the effect of quenching.

If the carbon is up to about 40 points, quenching will result in a very considerable hardness, while if the steel holds nickel, chromium, tungsten or vanadium, the hardness will be more pronounced. If, on the other hand, great hardness is demanded, from strictly carbon steel, the carbon should be even up to 90 points. If the steel is to be tough as well as hard it is a matter of oil quenching and subsequently tempering. Water quenching alone results in great hardness, but the steel would be brittle. Subsequent tempering would reduce the brittle character of the steel, while oil treatment imparts far greater toughness.

The carbon content then should be fixed higher for carbon steel than would be required for alloy steel, if the hardness is to be as a result of quenching and subsequent annealing, rather than by the cementing process. There are some practices to be condemned in connection with the hardening of steel (especially alloy steel), as, for illustration, the use of cyanide of potassium. It is not well to raise the temperature of one end of a piece of steel to a point high enough to engender hardness as a result of quenching after immersing the same in the cyanide. If one part is raised to a high temperature, and the other part is kept at a lower temperature (black), the result is, a zone between the hardened and the soft parts which is neither one or the other of the conditions that should obtain. The cyanide of potassium seems also to be incapable of imparting a safe hardness to the steel unless the steel itself is very low in carbon and free from alloys. In that event the depth of the hard skin is but microscopic and of no value in actual practice.

It is not uncommon to see camshafts with cams hardened by applying the flame of a "bunsen burner" to the cams, raising the heat to a high point (how high no one knows), then the cyanide is daubed over the heated surfaces and the quench is applied. It is plain enough that the purchaser of an automobile who has cams thrust upon him (hardened in this way) will not be afforded an insight to the fact in the "elusive" literature of the publication department of the makers of such automobiles.

The structure intervening a hard and a soft layer may be good and it may not. It is satisfactory in the cemented work, if the steel is primarily a low-carbon product. It is not satisfactory if the whole of the member is not raised to the same temperature. It is not proper to heat one end of a member and leave the other end cold. There is a junction of the two conditions that will not be equal to the other portions of the member in point of hardness, on the one hand, and of strength on the other.

From these crude methods of spoiling steel (in the attempt to harden it) to the most approved methods of heat treating is a long way. What is wanted for the most signal success is a complete equipment knowledge of its use, and the requisite qualities of the steel.

Required Equipment for Heat Treating.

(1) Exact means of determining the temperature.
(2) Suitable means of attaining any temperature up to 1,400° C.
(3) Exact means of maintaining a constant temperature for long periods of time.
(4) Means for quickly adjusting the temperature and changing the same.
(5) Means for protecting the steel to be treated from contact with objects that would tap the heat and render the temperature uneven.
(6) Means for slowly raising the temperature of the parts to be heat treated.
(7) Means for slowly cooling the parts to be heat treated.
(8) Means for quickly lowering the temperature of the parts to be heat treated.
(9) Suitable tools for deftly handling the parts without exposing them to air, or to such outside influences as would abort the desired action.
(10) Arrangements of the equipment such as would protect the manipulator from the poisonous fumes of the chemicals used in the process.
(11) An adequate forging plant.

In general there are two main methods of proceeding with the heat-treating process. The first is the one in which the parts to be treated are exposed to the burning gases and the atmosphere to a certain extent, and, the second, is a process by which the parts are submerged in a media of metallic salts, and the whole is raised to the desired temperature. In this way the parts to be treated only contact with the salts and the temperature is held quite uniform throughout the mass. The salts protect the steel from contact with the air or gases during the process. Of the two methods, the second is much to be preferred, yet even so, it is the method least used.

Muffle furnaces belong to the first method of heat treating, in which coal-gas is used as the source of heat. They work very well, indeed, and a good manipulator can deliver splendid product as a result of their deft use. It is not possible to protect the steel, however, from contact with the products of combustion, and it is not easy to uniformly heat the steel throughout its section, especially if the parts are bulky. It cannot be said the muffle furnace temperature may be measured with great accuracy, nor will one be sure that the temperature of the parts to be treated, will be the temperature as shown by the "pyrometer."

The pyrometer only contacts with the hot gases and not with the parts to be hardened. On the whole, however, the work done by the muffle furnace in the hands of a skilled manipulator is not to be harshly criticised, because the results are truly good. Certainly, the muffle furnace is a vast improvement over an open fire of any kind. It is also a fact that the muffle furnace is superior to a "bunsen burner," by means of which a hot blast

*Freid Krupp A. G. Essen un Ruhr.
†Sulphur and phosphorus are classed as metalloids.

is directed against the parts to be heated. Surely, this is not the way to realize good results. Certainly, it is not possible to maintain uniformity, if a bunsen flame is applied to one side of a piece and the other side is exposed to a cold draught.

The muffle furnace has the advantage of affording an indirect and uniformly heated atmosphere. This atmosphere does not seem to hold in its composition, elements or conditions such as tend to destroy the structure of the steel. On the other hand, it is not to be said that the atmosphere of the muffle furnace is the best possible. The exact atmosphere of the muffle furnace cannot be stated because the condition is one of partial combustion interstratified with the products of combustion. The coal-gas itself is a considerable variable, but it might approximate the composition as follows:

PRINCIPAL CONSTITUENTS OF COAL GAS.

Formulæ.	Names.		Volumetric per cent.
H	Hydrogen		25 to 50
	Light carburetted hydrogen		35 to 52
C_2H_2	Acetylene	Convertable Hydro Carbons	3 to 20
C_3H_6	Propylene		
C_4H_8	Butylene		
C_2H_4	Acetylene	Carbureters	?
$C_{10}H_8$	Napthalene		
CO_2	Carbonic acid		0 to 2
CO	Carbonic oxide		0 to 2
CN	Caynogene		5 to 9
NH_3	Ammonia		0 to 0.06
CS_2	Bisulphate of carbon		to 0.004
H_2O	Aquous vapor		to 2.5
N	Nitrogen		to 8
P	Phosphorus		trace.

Carbonic acid, carbonic oxide and water would constitute the chief products of combustion, the carbonic oxide would, of course, only be present if the combustion were incomplete. The nitrogen would remain as such (inert) and to these products must be added the atmospheric air requisite to dilute the gas for burning.

It has not been claimed by many who have taken an interest in the question of heat treatment of steel that the contact of the heated steel with the products of more or less complete gaseous combustion would lead to any ill results. That the steel will be in a more or less receptive state is not to be denied, hence it is a matter not to be entirely disregarded, this question of the contact of the steel with the atmosphere in which it is heated.

The more recent experiments on the subject tend to indicate that the atmosphere in which the steel is raised to a high temperature, does influence the situation in more ways than one. Nitrogen, for illustration, seems to increase the penetration of carbon. If parts to be cemented are packed in cementing materials and an excess of nitrogen is constantly supplied in any suitable way, the penetration of carbon will be to a greater depth in a given time.

The Influence of Nitrogen Upon Cementation.

If the cementing materials are high in nitrogen, the same results will follow, to a less extent, in all probability. If, however, it can be shown that nitrogen increases the penetration of carbon in steel at a cementing temperature, this is equal to saying the gas atmosphere in contact with the incandescent steel will influence the results, for good or ill. If we do not know the extent of the changes that may result, we do not know if the changes are beneficial or otherwise.

Under such conditions it is the safest to eliminate the atmosphere if it can be done with safety. It is not always the case that carbon is to be imparted to the steel, and on some occasions increasing the carbon content is far from the right thing to do. The most approved method of heat treatment of steel must be that in which the steel is submerged in a media of the most beneficial sort. In this way the steel is protected from contact with all but the desired contact media. This summary of the investigations of G. Shaw Scott was reported in the *Horseless Age*, Feb. 12, 1908, and while it cannot be regarded as conclusive and final, it is nevertheless pertinent, and normal to general expectations in this work.

"G. Shaw Scott, of Birmingham University, in a paper read before the Iron and Steel Institute of Great Britain, shows the influence of nitrogen upon the penetration of carbon into iron or steel in the process of carbonization or cementation. The mixtures employed in cementation by various manufacturers are very numerous, including coke potassium ferrocyanide potassium cyanides, hydrocarbon vapors, bone, animal horn, graphite, burnt leather, animal black, barium carbonate, etc., either alone or in combination, each maker having a different formula. In every mixture used nitrogen exists under some form or other, however.

Mr. Scott took a certain number of identical bars of soft steel and subjected them to cementation with various mixtures and under given conditions. The bars were then broken, and their structure examined under a microscope. The first two experiments were made with anthracite and coke. Two bars, one surrounded with coke and the other with anthracite coal, were heated to 900° C. for four hours, and showed a penetration of from 0.15 to 0.16 millimeter (0.0059 to 0.0062 inch) only. The third experiment was made with burnt leather under the same conditions as before, and showed a penetration of 0.0622 inch, ten times greater than the former.

Thinking that this was due to the effect of nitrogen, two other bars were taken, one being previously heated to 550° C. in an atmosphere of ammonia for four hours, and placed in a special cementation chamber, with a non-nitrogenous agent, as burnt sugar, for eight hours, during which they were subjected to a constant temperature of 1,000° C. This experiment, after a number of repetitions, showed a ratio of penetration of 45 to 32 between the two bars, the ammonia vapors assisting the penetration of the carbon.

At 1,000° C. cementation can be easily accomplished, since with a non-nitrogenous agent the steel approaches its melting point, and the preliminary ammonia treatment influences the steel during the first few seconds of the process only. Mr. Scott, therefore, built a special furnace in which two boxes could be placed. One of these boxes had a tube for the admission of the ammonia gas; this tube was 0.472 inch diameter and 2.36 inches long, and was screwed into one side of the box, small apertures allowing the escape of gas in the opposite side. The second box has similar dimensions to the first, but had no tube and was hermetically sealed. Bars covered with burnt sugar were placed in each box, and both boxes placed within the furnace, where they were subjected to a temperature of 900° C. for four hours. The ammonia gas was passed into the first box during the whole time. The bars were then allowed to cool.

After the bars were withdrawn from the boxes they were examined and showed very different aspects. The bars which were untouched by the ammonia were blue-blackish and were easily cut with a saw, while the others could not be sawed and presented a whitish appearance. The treated bars showed a penetration of .0708 inch, while the untreated bars did not show more than .0566 inch. This completed the experiments.

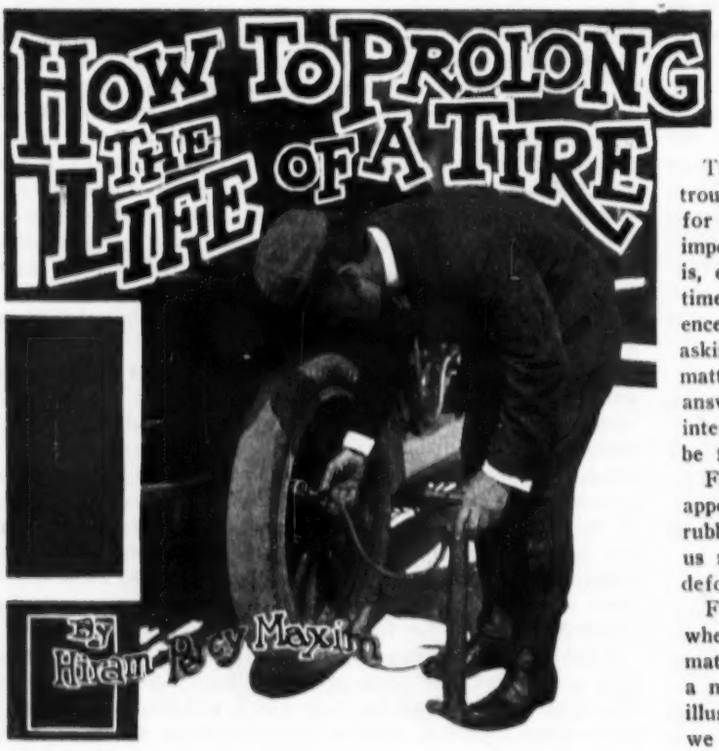
It is evident from the above experiments that the presence of nitrogen in cementation acts beneficially in causing a deeper penetration of the carbon into the steel."

While the above experiment is very interesting in itself, it is of more interest here in that the reverse point of view tells us that if carbon is not wanted to a great depth, it will be desirable to avoid contact with the nitrogen in such form as to render it potent as an agent. There are other gas problems in the same way, and while time may afford the requisite data by means of which the best results may follow, the fact remains, for the present it is wise to eliminate all unknown quantities.

Of "muffle furnaces" there are many sizes, shapes and types; they serve for many purposes and, as before stated, in the hands of skilled manipulators, serve the purpose very well, indeed. There are other and superior methods of heat treating, however.

(*To be continued.*)

How To Prolong The Life of A Tire



By Hiram Percy Maxim

WHAT is the matter with our Tires? This question is probably asked by the autoing public more times a day than all other automobile questions put together. That there is very much the matter with our auto tires is undoubtedly the case, and it is the writer's object to point out what is probably the greatest trouble.

The primitive tire is the metal band around a wheel which forms a tread. The modern pneumatic tire is a band of compressed air around a wheel which forms the yielding tread we require for an automobile. The metal tire is able to hold its shape and its position on its wheel by virtue of its natural strength. The air tire is not only unable to hold itself together, but it is striving with all its might to dissipate itself. It requires some form of a retainer or envelope for holding it—and just here, in more senses than one, lies the rub.

The container or envelope which many years of experience has taught is the best compromise, is a combination of rubber and cloth fabric. The former furnishes the air tightness, while the latter furnishes the mechanical strength to withstand the strains. For convenience in repairing accidental air leakages a removable inner tube is used, which leaves the strain and wear resisting to the outer portion of the structure, which then becomes merely an outer casing or "shoe," as it is termed.

Now, it so happened in the course of the development of the automobile that as vehicles became rapidly larger and heavier and speeds higher and higher, this outer casing became thicker and stiffer until a very resistive structure resulted. Where the ordinary tack or nail would once always puncture, with the thick casings they were not long enough or strong enough. To-day it requires quite a robust nail to get through and puncture an inner tube. Some of us came to believe that tire troubles were beginning to be conquered, especially for the first few hundred miles after new casings were put on. This belief has always been short-lived, however, for a worse difficulty was confronted in the form of ruptures or bursting of the outer casings, or "blow outs," to use the popular term. This trouble is now the most pronounced form of tire trouble, some autoists believing it to be 90 per cent. of all tire trouble.

The failure of a casing is, of course, a very serious form of trouble, as a car cannot go on until a new casing is substituted for the one which ruptured, even though we overlook the very important expense involved. Under such circumstances the tire is, of course, blamed, and usually another make is tried next time. After trying every make and finding no material difference, the autoist, in exasperation, demands an explanation by asking the question with which this article opened—"What is the matter with our tires?" This question has not been satisfactorily answered publicly, and it, therefore, is a matter of considerable interest. In the accompanying illustrations the tire itself will be found to give its own answer.

Fig. 1 shows a 4-inch tire in its natural form as it would appear if cut open. The fabric which is incorporated in the rubber is shown distinctly. The inner tube is shown inside. Let us now see the effect upon this structure of deformation, for deformation and reformation, back and forth, is its daily life.

Fig. 2 shows a moderate deformation, such as would occur when a properly inflated tire ran over an obstruction approximately 1 inch high, something that occurs a great many times a minute during the running of a car. It will be seen in the illustration that the walls of the casing are slightly bent. When we bend such a relatively thick wall we require that the material in the wall "work" or stretch or "flex" very considerably. The more we bend the wall the worse this working or flexing.

Now let us look at Fig. 3. This shows what occurs when an *improperly* inflated tire runs over an obstruction approximately 1 inch high. Observe the bad bend in the fabric and imagine the result of repeatedly bending this material back and forth this amount, thousands and thousands of times. This is what happens when an improperly inflated tire is in motion. Obviously it must break the wall structure at the sharpest point of the bend sooner or later. It will be sooner if the bend is sharper, due to the tire being softer, and later if the bend is gentle, due to the tire being harder.

At this point let us examine ourselves and ask how we inflate our tires. Most of us must answer that we pump the tire until it *looks* fairly round where it bears upon the ground. Then we usually kick it, apparently on account of some extra accurate gauging ability of the toes of our boots. Look at Fig. 4. This is a photograph of a 4-inch tire on the rear wheel of a car, and which has been pumped by gauge to exactly 30 pounds pressure. *It looks fairly round.* In a hurry or on a hot day it is very easy to feel sure it is pumped up enough.

Now look at Fig. 5. This shows the same tire pumped up to 50 pounds pressure. It must be confessed there is difficulty in

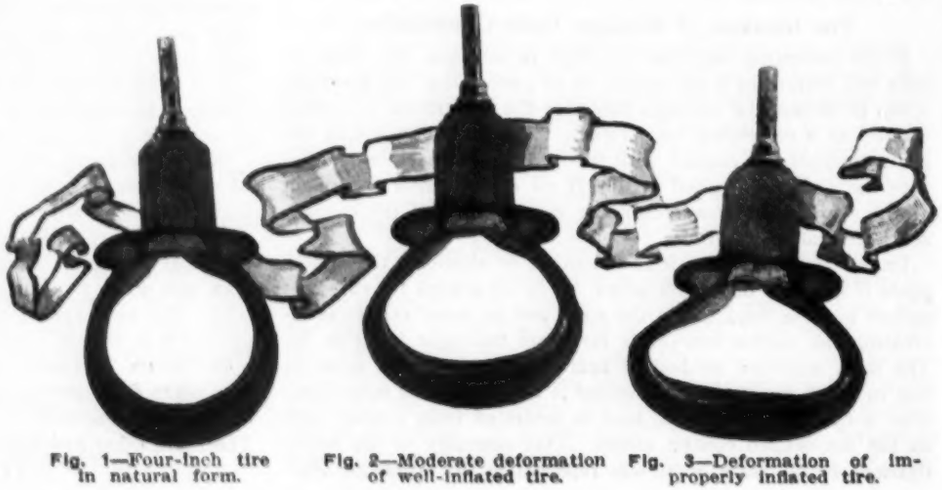


Fig. 1—Four-inch tire in natural form.

Fig. 2—Moderate deformation of well-inflated tire.

Fig. 3—Deformation of improperly inflated tire.

telling the two figures apart. But this is not the worst. Examine Fig. 6. This is the same tire pumped up to 90 pounds pressure and photographed from the point which most tires are viewed from when judging their inflation. Ninety pounds is the pressure the tire should have, and tiremakers so advise.

Although it is three times higher pressure than that in Fig. 4, and nearly twice as high as that shown in Fig. 5, it would take a careful measurement to determine it. No amount of "looking" or kicking would give even a fair approximation of which was which—and here we have the real "nigger in the wood-pile" of our blow out troubles.

We inflate our tire by guessing at the degree of inflation, or attempting to judge it by the appearance of the tire, whereas the photographs clearly show that there is but little difference in outside appearance between a tire pumped up to 30 pounds pressure and one pumped up to ninety pounds. There is hardly a bit of difference between the appearance of 50 pounds and ninety pounds. Yet 50 pounds corresponds to the sharp bend shown in Fig. 3 and 90 pounds corresponds to the gentle bend shown in Fig. 2.

There is one more experiment we should make. This is to catch a tire actually passing over the 1-inch high obstruction, so we may study deliberatively just how things are. Look at Fig. 7. This shows our 30 pounds inflation, which is the favorite of our wives and daughters on account of its soft riding qualities, passing over the obstruction. Notice the terrible punishment the thick and stiff wall of fabric must be receiving. The bend shown in Fig. 3 is not nearly as bad.

Now turn to Fig. 8. This shows our 50 pounds inflation passing over. This pressure is the average existing in the great majority of tires the country over. While its deformation is not as bad as the 30 pounds pressure of Fig. 7, yet we can easily see that it is enough to rapidly bring about a fabric rupture, when we realize that the passing over 1-inch high irregularities is practically continuous in the running of a car.

Now, finally, let us see what the deformation would be if we kept our tires pumped up to where the tire maker tells us we should keep them. Look at Fig. 9. This shows the properly inflated tire taking a 1-inch high obstruction. The bending and punishment of the casing is entirely different, and a casing would be able to stand it longer, probably, than the rubber tread would stand the wear it is subjected to. In other words, *although a properly and an improperly inflated tire have very nearly the same appearance when standing upon a flat surface, they suffer an altogether different degree of punishment when passing over irregularities.*

This really tells the story. The only thing remaining is to tell how a tire should be inflated to be sure that it is done properly.

The only way to properly inflate a pneumatic tire is to use a tire pressure gauge to measure just what pressure is actually in the tire. Such a gauge is shown in Fig. 10 when actually in use. The gauge is a small pressure gauge screwed onto the tire valve stem, and provided with a little lifter for lifting the tire valve so that the pressure in the tire may freely enter the body of the gauge. The tire pump or the inflating bottle tube is screwed to the gauge. With this arrangement there is no trusting to appearances. One positively knows.

And, now, in conclusion: With the tires of a car always hard it goes without saying that they will last longer. It is not impossible always to have them properly inflated, although it is by no means always easy to insure it. The ordinary chauffeur is not at all fond of pumping up a large tire, and he is very prolific in finding and devising reasons why it should not be done. He does not pay the tire bill, however. Tank and mechanical inflators are appearing upon the market in increasing numbers all the time, and perhaps this may assist in securing proper inflation. But in any event, unless the writer is very much more in error than he thinks he is, he can answer the question with which this article opened. This answer is: "We do not keep them properly inflated."

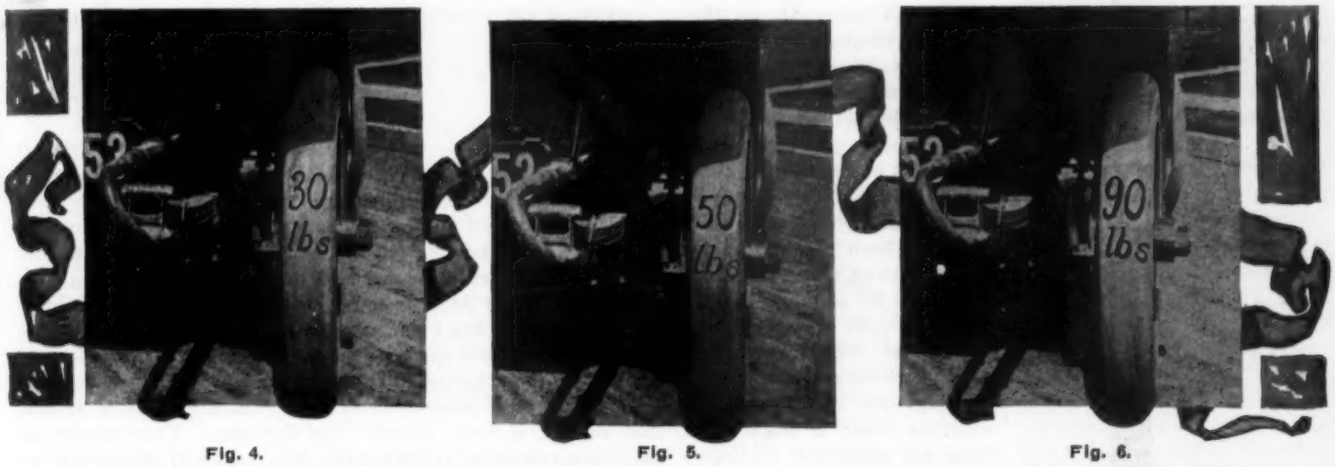


Fig. 4. Fig. 5. Fig. 6.

Showing tires blown up to 30, 50, and 90 pounds pressure, and which shows that the appearance of the tire is deceptive.

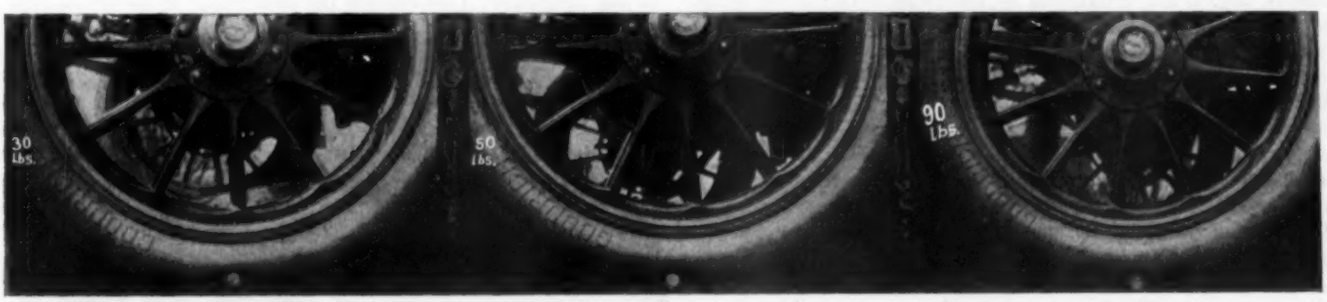


Fig. 7. Fig. 8. Fig. 9.

Showing the same tires passing over obstructions and the relative depressions in their surfaces, under 30, 50, and 90 pounds pressure.

CONSTRUCTION OF LIQUID TACHOMETERS*

By AMASA TROWBRIDGE, Member A. S. M. E.

IN any instrument designed for measuring the speed of a revolving wheel or shaft, the centrifugal force developed by the revolution of some part of the measuring instrument is almost universally used to give the indications. This centrifugal force should be applied as to eliminate, as far as possible, the errors due to friction or wear. This, its makers assert, cannot be attained by the use of a solid body as the flying balls in a ball governor, or the moving weights of a shaft governor. The Veeder tachometer, makes use of a liquid in a device similar to a centrifugal pump. By careful experiments extending over nearly eight years several forms embodying this principle have been perfected. As the paddle of the pump does not touch the case in which it revolves, there is no wear between the revolving paddle and stationary case. The bearings are so constructed that the wear is slight and does not affect the readings. The liquid does not change its character appreciably under any circumstances, and consequently the indications of the instrument will be correct after it has once been properly graduated.

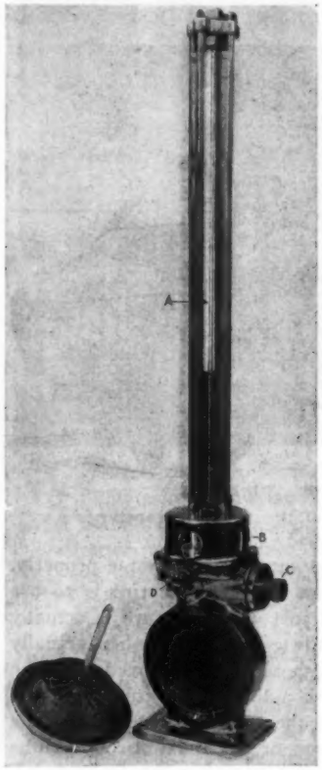


Fig. 1.—Veeder liquid tachometer.

The principle on which the liquid tachometer acts is, that the pressure developed by the centrifugal force of the liquid, when the instrument is running at a certain speed, is a definite quantity. This pressure forces liquid up the indicating tube A, Fig. 1, and is balanced by the pressure due to the height of the column of liquid in the tube.

Referring to the formula for centrifugal force, which is $F = \frac{Wv^2}{r\,g}$, we notice in this formula that there is but one variable, when r, the radius of the paddle, and W, the weight of the liquid, are fixed. Hence the indications of the instrument depend entirely on the velocity and do not change if wear is eliminated. The friction of the pump, generally speaking, need not be considered, nor its efficiency. If there be no flow of the liquid, the force F is expended in maintaining a pressure P, and this is equal to the pressure Wh due to the height of the liquid column. When the column is at rest, that is, when the speed is constant, F equals P, hence $\frac{Wv^2}{r\,g} = Wh$. It is obvious from this that W may be varied at will without materially affecting the height of the column. This is found to be the case, and it makes little difference in a liquid tachometer whether the liquid employed be something heavy like mercury, or light as alcohol. The indications are essentially the same for both liquids.

It is, of course, highly important that a suitable liquid should be chosen for such an instrument. In the first place it is necessary to choose a liquid which will not freeze at any temperature commonly encountered. It should be also as safe as possible in regard to fire, because it may frequently be used in the neighborhood of an internal combustion engine, where inflammable vapors would be dangerous if allowed to escape. Also, it should be readily obtainable; and such that its viscosity will not be materially altered by the ordinary change of temperature. The viscosity of the liquid makes a slight difference in the height of the indicating column.

EFFECT OF VISCOSITY ON REVOLUTIONS REQUIRED.

Material	Kerosene.	Water.	Alcohol.	Benzine.	Sperm Oil.	Paraffin Oil.	Valvoline Oil No. 23	Glycerin.
Revolutions required	852	851	850	849	807	792	788	779

A series of experiments was conducted to determine the relative viscosities of various liquids. The more commonly used liquids were tested in the following manner: An instrument having a long tube was put on the testing machine filled with one liquid and run at such speed as to give a fixed height of column. The first liquid tested being alcohol, a height of column corresponding to 850 r.p.m. was taken. The other liquids were each in turn put into the same instrument, and the revolutions of the instrument required to maintain the same height of column were taken, as shown in above table. It is surprising to find that benzine is more viscous than kerosene. Experiments are still being conducted on this point, the results of which are not ready for publication. Other points which must be considered are the lubricating qualities of the liquid and its liability to corrode the metal of which the instrument is made.

The Veeder tachometer, in one of its present forms, is shown in Fig. 1, with paddle removed. This instrument embodies all of the necessary points enumerated above. The only moving part of the instrument is the paddle, which imparts the necessary centrifugal force to the liquid contained in the body of the instrument. A small reservoir B is located directly above the paddle case. In the center of this reservoir is a glass tube through which the liquid flows to the glass indicating tube A. A suitable zero mark is provided around this small tube in the center of the reservoir. The liquid rises by capillary attraction in this small central tube somewhat above the level of the liquid in the reservoir. This enables the instrument to be set at zero very handily, a displacement plug operated by a small thumb nut shown at C enabling the operator to raise or lower the height of the surface of the liquid to exactly the zero mark. The glass indicating tube is about 12 inches high, although a scale fully 3 feet high can be used where extreme accuracy is necessary.

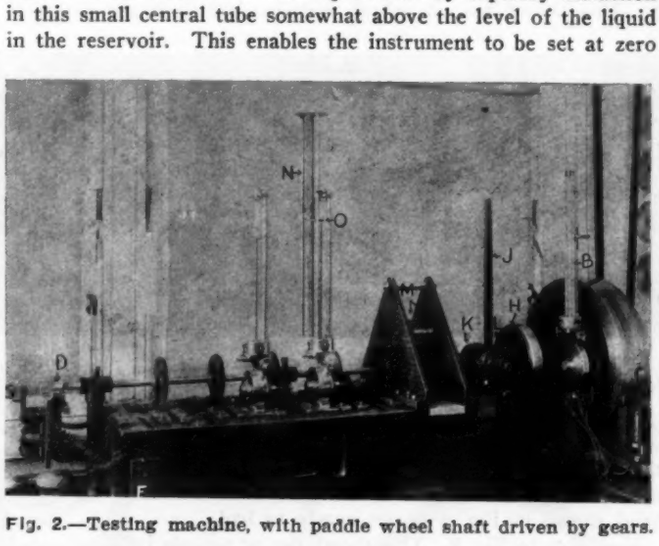


Fig. 2.—Testing machine, with paddle wheel shaft driven by gears.

*Paper presented at the New York meeting (December, 1908) of The American Society of Mechanical Engineers.

Free passage is provided from the reservoir to the center of the paddle wheel, allowing the liquid to flow freely to the paddle wheel, from which it is thrown out through very small orifices in the periphery of the paddle case. At the front of the instrument is a small handle *D*, which operates a valve to choke the passage from the pump to the indicating column. This prevents

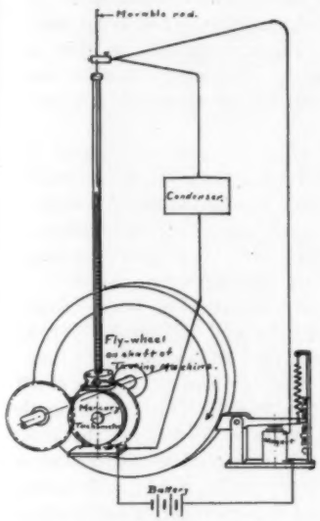


Fig. 3.—Automatic speed controller for testing machine.

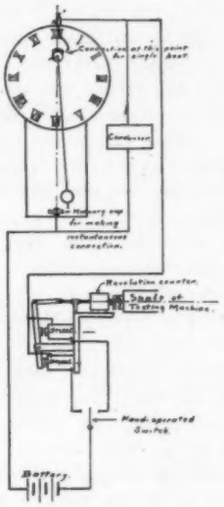


Fig. 4.—Connections for the speed counter.

the dancing or vibration of the liquid column, due to any sudden fluctuation in the speed of the revolving body whose revolutions are being indicated. The liquid used in this instrument is alcohol colored with an aniline dye. This liquid has been found extremely satisfactory, although other liquids may be used in place of it for certain cases.

It is evident that the graduations in this instrument will not be evenly spaced from zero up to the maximum. The height of the liquid column depends on the centrifugal force, which varies with the square of the speed of the paddle; hence, the graduations will be more open at the top of the scale for the high speeds than at the bottom, where the low speeds are measured. This is an advantage in some ways, especially on automobiles, since the graduations are large at high speeds when the vibration is greatest. Of course it necessitates a number of different instruments to cover the ordinary ranges of speed because the readings from zero up to about one-third of the maximum reading of the instrument are of no value, the graduations being so close that they are entirely omitted.

The liquid is admitted to the paddle case from the reservoir by passages on both sides. When the liquid is admitted from one side only, a slight change in the position of the paddle axially makes a change in the indications. This is not found to be the case where the balanced admission opening is used.

The blades of the paddle are radial, for the purpose of making the instrument reversible. The radial blade is, of course, not the most efficient, but, as stated above, the efficiency need not be considered. A ball thrust bearing is provided for the paddle shaft, thus eliminating any wear that would prove injurious. The outlet for the liquid consists of a number of small radial holes, equally spaced around the periphery of the paddle case. With a single discharge opening it is found that if through wear of the bearings the paddle becomes eccentric with the case, then reversing the instrument changes the indications. The diameter of these outlet holes is very small, to check any surging of the liquid. They discharge into an annular groove extending around the paddle case, and this annular groove is connected by a single hole to the indicating tube.

One of the greatest difficulties encountered in making this instrument has been to get the entrained air out of the liquid. The small passages used in the pressure side offer little opportunity for it to escape, hence it stays in the paddle case. The trouble has been eliminated by so shaping the paddle that as soon as the paddle revolves this air is forced to the center of the paddle and is discharged through the center openings. If the air is allowed to stay in the paddle case it furnishes a compressible cushion for the column of liquid, and materially reduces the effective area of the blades, especially in the small diameter paddles. A slight change in the temperature of this air also affects its density to such an extent as to alter the reading of the instrument. Some instruments having glass sides were built for the purpose of studying the action of this air to determine ways for eliminating it.

The sensitiveness of the instrument is such that at the maximum speed for which it has been made commercially, namely, 2,500 r.p.m., a difference of one or two revolutions is very noticeable. This shows that the instrument can be made to indicate within less than one-tenth of one per cent. Under ordinary circumstances the indications will be correct within one-fourth of one per cent.

The instrument is portable, and can be readily handled, and there is no difficulty in holding the column practically vertical. It may be used either by holding it in the hand, the paddle wheel shaft being driven by a short flexible shaft pressed against the end of the revolving member whose revolutions are to be measured, or it may be fastened down and driven by gears, as in Fig. 2. This latter is the preferable method because the instrument is then held very steadily, and the entire attention of the operator can be given to reading the indications.

To carry on the experiments for these instruments, Mr. Veeder built a testing machine, shown in Fig. 2. This testing machine is run by an alternating current motor used exclusively for this purpose. The motor is connected to the testing machine through an Evans friction cone, which gives a ready means of changing the speed of the machine through a certain limited range.

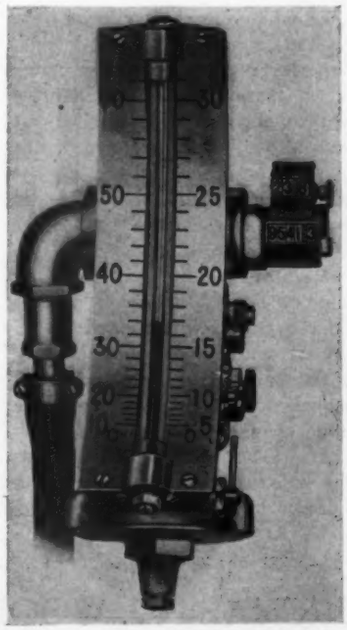


Fig. 5.—Type of tachometer for automobile service.

To keep the speed of the testing machine constant, a mercury tachometer *B*, Fig. 2, having a tube about three feet high, is placed at the driving end of the machine. This tachometer controls an electrically operated brake, which bears against the periphery of the fly-wheel, as shown at *C* in Fig. 2. Because the inertia of this wheel is very great in proportion to the force applied by the brake, there are no sudden fluctuations of speed. The mercury tachometer is an extremely delicate instrument and either makes or breaks the circuit which operates the friction brake. An insulated rod is carried through the top of it and connected, as shown by the diagram, Fig. 3, to the brake magnet. By adjusting the vertical rod, the tachometer will control the testing machine through a considerable range of speed. The action of the brake is clearly shown in the diagram. A condenser is used to avoid oxidation of the mercury at the point of contact.

To check the testing machine, the shaft of the machine is connected to a revolution counter, as shown at *D*, Fig. 2. The connection between this counter and the shaft is automatically made at the beginning of a minute by master clock. At the end of a minute, this connection is automatically broken by the same clock, and the difference in indications of the counter

shows the number of revolutions made by the shaft of the testing machine in the minute. Slight changes in the speed of the spindle of the testing machine will, of course, be very evident from this method of checking.

The diagram, Fig. 4, shows the method of connecting the clock to the revolution counter, which is driven by the end of the shaft of the testing machine. Special attention is called to the fact that the connection is made by the clock for one single beat, or half period, of the pendulum only; that is, while the pendulum swings from left to right. This necessitates that the time during which there is a complete circuit is a small fraction of a second, namely, while the point of the pendulum passes through the mercury cup at the middle of the clock, hence at that point which the pendulum passes with its greatest velocity. This arrangement determines that exactly one minute shall be the time between the throwing in of the revolution counter and its disconnection. It was also found necessary to insert a condenser in this electric circuit for the purpose of preventing an arc, as in the case of the mercury tachometer.

At *F*, Fig. 2, there is seen the hand switch by which the circuit is made ready for the clock to throw the revolution counter into or out of gear. By throwing the switch one way the clock will throw the counter into gear. If thrown over on to the other side, the counter is thrown out of gear at the end of that minute. By using this hand switch it is possible to make the count extend over as many minutes as may be desired. The shaft of the revolution counter is carried by the lever *G*, Fig. 2, and has on its end a key which engages positively in one of a number of slots on the end of the testing machine shaft. This counter has been safely operated at as high a speed as 5,000 r.p.m., and this method of registering is such that it is absolutely reliable.

In Fig. 2 there is shown at *H* a friction clutch, the outer part of which is driven by the fly-wheel shaft. Between the bevel gears *K* and *L* is a jaw clutch, keyed to the shaft carrying the inner part of the friction clutch. This is operated by the lever *J*. The first part of the motion of the lever engages the jaw clutch with one or the other of the beveled gears. Its remaining throw engages the friction clutch. By throwing the lever one way or the other, the direction of rotation of the main shaft of the machine may be changed.

For calibrating any particular instrument, the fly-wheel end of the shaft is operated at a constant speed, usually 1,000 r.p.m. Under ordinary circumstances, with a speed of 1,000 r.p.m. the variation will be less than half a revolution either way from the standard. With special care, this can be reduced to ¼ revolution, or a total variation of one-twentieth of one per cent. This speed is transmitted to that part of the shaft which directly drives the instruments through the back-gearing shown at *M*. By means of the changes accomplished by these back-gears, the speed of the fly-wheel need not be changed during the calibration of the instrument.

The device shown at *N* in Fig. 2 is used for calibrating the instruments. The screw in this device has a very accurately cut thread with 14 threads to the inch. At the top of the device is seen a plate with 100 graduations equally spaced. From this it is seen that a vertical adjustment of the sighting piece shown at *O*, Fig. 2, amounting to about 0.0007 in., can be measured.

A number of instruments of a given size are set on the testing machine at once. The height of the liquid column in these instruments is then measured, a record being kept for each instrument. The average of these readings is then taken for establishing a suitable scale to be used on instruments of that size. The calibrating device is removable and can be shifted from instrument to instrument without changing its setting. In this way very small variations in the different instruments can be noted and any errors due to bad workmanship or imperfections in the parts can be readily detected.

Among the many applications to which this tachometer has been adapted, the first has been for laboratory service in testing dynamos, engines and other machines having revolving members. The instruments have also been adapted for switchboards, grouped with the other instruments. Here they give a continuous indication of the r.p.m. of either the engine or generator.

Another use to which these instruments have been adapted is as a speed indicator for automobile and locomotive service. The type commonly used on automobiles, shown in Fig. 5, has a double paddle, the larger diameter used for low speeds, the smaller for high. To make use of this, a double scale is put on the instrument, one reading to about 30 miles per hour, the other twice as high, and the instrument is arranged to use either of these by simply shifting a small lever, which turns a three-way valve. If the lever is pulled toward the operator, a valve closes the passage from the large diameter paddle to the indicating tube and opens the passage from the small diameter paddle, and the instrument is set for the high-speed scale. If the lever is pushed back, the opening from the small paddle is closed and the one from the large paddle opened. There is no harm done if the liquid flows over the top of the instrument as it is returned to the reservoir. In this instrument there is a reservoir on each side of the indicating tube, so that the major portion of the indicating tube is nearly over the center of gravity of the free surface of the liquid. When the car is running at low speeds, however, the column of liquid in the indicating tube is not directly over the center of gravity of the free surface, with the result that any acceleration of the car makes the liquid indicate somewhat higher than it should, while any retardation has the opposite effect, this being due to the inertia of the liquid. For automobile service these errors are not great enough to make any particular difference.

In the form of instrument used for railroad service, the center of gravity of the free surface of the liquid lies at the center of the indicating tube, so that acceleration or retardation of the car, or an inclination to either side, has practically no effect on the indicator.

These speed indicators have ball-bearings throughout and all the features enumerated above, which go to make a permanently accurate instrument. An odometer giving the mileage for each trip, as well as the total mileage, is attached to each one, thus making them complete devices.

WHEN PURCHASING WOOD ALCOHOL FOR COOLING

THE idea in using alcohol in the cooling system, is to get away from the use of water. In other words, the freezing point of the liquid used must be lowered, to prevent freezing in the system, and the consequent disruption, which is bound to follow if the solution solidifies, since then bulk increases and is irresistible. It would seem quite out of place to purchase alcohol for the purpose, were the same half water, since water is to be displaced in the system. In the purchase of alcohol then, for the purpose, care should be exercised to order the same as free from water as possible.

According to the United States Pharmacopœia, "alcohol" should hold 91 per cent. alcohol and 9 per cent. water, "proof spirits" only hold 55 per cent. of alcohol, and "absolute alcohol" will run about 98 per cent. of alcohol with 2 per cent. water. An alcoholometer reads Zero (0) in water and 100 if there is no water present. The alcoholometer, then, shows by its workings the percentage by volume of alcohol present.

Because of the high price of grain alcohol, the formula for which is C_2H_6O, it is customary to use wood alcohol, the formula for which is CH_4O, and because of this difference in the composition of the two grades of alcohol, the alcoholometer should be purchased to use with wood alcohol on the one hand, or with grain on the other, depending upon the kind of alcohol taken in any given case.

LETTERS INTERESTING AND INSTRUCTIVE

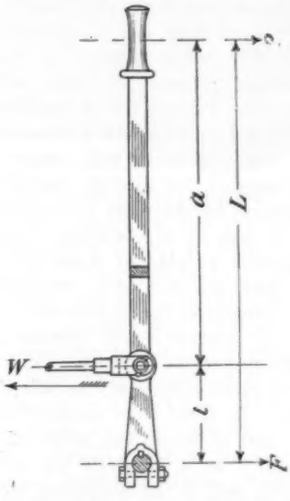
A PROBLEM IN SIDE LEVER BRAKE CONTROL.

Editor THE AUTOMOBILE:

[1,647.]—I desire to equip an old car with a new set of emergency brakes, and am puzzled about the length of the side lever, and the point at which to fasten a cable (above the fulcrum) in order to be able to work the brakes, without too much of an effort on my part, when I desire to apply the brakes. Will you tell me how to solve this problem? LAZY.

New York City.

In the absence of data in relation to the car, and also, in relation to the brake-drum shoes, and means of applying pressure, it is only to be able to advise you in relation to the "side lever," which, apparently, is all that you want to know.



Illustrating Side Lever Brake Problem.

The illustration will enable you to grasp the situation, if you will there note the reference letters, and then use the formulas of levers of the second class, viz.:

$P = \frac{W l}{L}$ = pull exerted by the operator, say 50 lbs.;

$W = \frac{P L}{l}$ = equivalent strain resultant of the pull "P" in pounds (neglecting friction);

$l = \frac{P a}{W - P}$ = distance from the fulcrum to the work rod in inches;

$L = \frac{W a}{W - P}$ = length from the fulcrum to the point of pull, in inches;

$a = L - l$ = the distance from the point of pull to the work rod, in inches.

For a pull of 50 pounds, if $l = 6$ inches and $L = 30$ inches; we would have:

$$W = \frac{50 \times 30}{6} = 250 \text{ lbs.}$$

Likewise, any other similar problem can be solved, and knowing what the value of "W" should be, one can solve for the dimensions by means of the formulas, assuming some of the dimensions.

ENERGY OF BATTERY SHOULD BE CONSERVED.

Editor THE AUTOMOBILE:

[1,648.]—I have two spark coils, and would like to know which is the best, since they both give about the same length of spark. No. 1 coil takes about one ampere of current, while No. 2 coil takes very much less. It looks like the one taking the least current would be the best. G. D. ROGERS.

Belton, S. C.

The problem is one involving two fundamental ideas, viz:

(a) the spark must be adequate for the purpose;

(b) the battery energy should be conserved.

The coil that shows the highest ampere reading is the one not to use if the other coil will deliver a spark of sufficient energy to accomplish the purpose. Sometimes the voltage of the battery is more than it ought to be in view of the coil used. This ends in lack of economy, at the expense of excess battery. Each coil has its constant, that is to say, the voltage of the coil should be considered, in selecting the battery.

CASE HARDENING NICKEL STEEL PRODUCT.

Editor THE AUTOMOBILE:

[1,649.]—I would like to know the exact difference between nickel steel of the ordinary grade, and the same kind of steel to be casehardened? CURIOUS.

New York.

Nickel steel may be of any of the compositions in which nickel may be a component. If, however, the steel is to be "casehardened," it is necessary that the carbon content be held at a very low point.

If, in casehardening steel the carbon is high, the shell will be glass-hard, as desired, but the core will be hard also. The result will be, on the whole, the steel will not possess kinetic properties to any extent, and in the absence of these properties the steel will fail to sustain, under shock, loads.

On the other hand, if the carbon is low the core will remain soft while the shell will attain "glass hardness" by virtue of the cementation, due to which the carbon will be increased, by artificial means, in the shell, to a sufficient depth to serve the purpose.

The shell will be just as hard in the cemented low-carbon steel as in the higher carbon material, the strength under shock loads will be vastly greater.

A GRAVE DEFECT OF DESIGN.

Editor THE AUTOMOBILE:

[1,650.]—I have a "double-opposed motor" and lately, when I was sailing along, the bottom of the water tank fell out, leaving me in a bad way. Closer examination enabled me to discern a leak of water to the combustion chamber of one of the cylinders, and I decided that I must have run the motor (for some distance) without water, to the end that the casting must have been damaged, but I cannot locate the trouble more than to assure myself that the water does not get into the cylinder. What can you make of it?

New York City. N. B.

Your trouble is easy enough to locate, but it will not be so easy to repair. The water tank blew out because the explosive mixture accumulated in the water system, as a result of a defect in the cylinder-head plug, brought about through the difference in expansion, between the inner and the outer walls, and the fact that the threads on the plug or hole were stripped.

Fig. 1.—Threaded bronze plug in cylinder head.

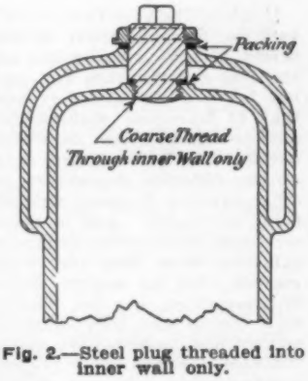


Fig. 2.—Steel plug threaded into inner wall only.

Fig. 1 will show the details of design and the repair will depend upon whether or not the threads were stripped off of the plug or the cylinder-head hole. If the threads in the hole are stripped, it is to have the hole enlarged and rethreaded, besides having a new plug made to fit the new diameter. Instead of the scheme of design, Fig. 1, adapt the scheme Fig. 2. Even so, it is a fact that plugs placed in this fashion are defective, in that the difference in expansion are not compensated for in any

way, and brute force must struggle with that which skill would manage without an effort. Under the circumstances, Fig. 2 shows the lesser of the evils. If the work is well done, the repair in this fashion, will sustain.

PICRIC ACID DESTROYS THE CYLINDER.

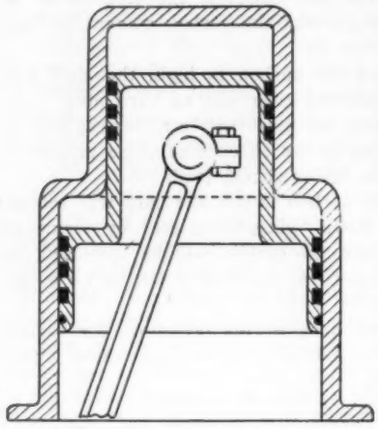
Editor THE AUTOMOBILE:

[1,651.]—Have you any data on the subject of picric acid being used by the racers in the Vanderbilt Cup race? Do you know what proportions were used?

Will you also explain to me why there is a practical limit to the size that cylinders may be bored? What is it that fixes the limit—is it weakness of cylinder walls or difficulty in cooling or carburetion?

Will you explain the double piston system of the Gobron-Brillé? Is there an increase of horsepower resulting from their arrangement?

THE QUESTION MARK.
Far Rockaway, L. I.



Section of Double Piston Idea.

Picric acid belongs to the detonator family and when mixed in gasoline, after it is dissolved in alcohol, it does increase the rate of flame propagation, resulting in more power. A saturated solution of picric acid in alcohol can serve as 5 per cent. of the total fuel, the balance gasoline. It must be remembered that picric acid is an etching ingredient, which is another way for saying that it will destroy the cylinder walls.

In relation to the question of the sizes of cylinders, enough is to say there are no such limits as you would seem to think. Cylinders for internal combustion motors are built in very large sizes, say, 20 inches bore. In automobile work, it is the weight efficiency that limits the use of the larger cylinders, it being the case that the weight efficiency decreases rapidly with increasing bore of cylinders.

The idea of the double piston, as used by the Gobron-Brillé Company, is illustrated in the figure herewith.

WHY USE FIVE CYLINDERS IN A MOTOR?

Editor THE AUTOMOBILE:

[1,652.]—The evolution of the gasoline engine as applied to motor vehicles, bringing about an increase in the number of cylinders, seems to have skipped the number five in its progress. There are four-cylinder cars and six-cylinder cars, but the writer has not heard of five-cylinders being used in the commonly accepted type of four-cycle multiple-cylinder motors. Why is this? The answer might be that an addition of 25 per cent. of power to that developed in four cylinders is inadequate to the additional expense of the different crankshaft construction alone, not to mention other expense features, six-cylinders giving 50 per cent. increase being preferable. And in these days when lower-priced cars are receiving the attention of manufacturers, the matter of one or two cylinders more than four may, perhaps, be neglected by many makers. But for smooth running and perfection in cars of 35 to 50-horsepower, why not five cylinders? Why not five instead of six? To be sure they could not be mounted in pairs, but many makers now assemble six singly. Five cylinders certainly provide the best possible order of firing for multiple-cylinder four-cycle engines. A glance at a diagram showing five crankshaft cranks 72 degrees apart around the circle, with the order of firing in cylinders numbered from front to rear, say one, three, five, two, four, one, reveals that the cranks receive the firing alternately around the circle, without interruption of that order, effecting a more perfect distribution than is possible with six cylinders. Then, too, the difficulties attending the demand of a six-cylinder engine upon the carbureter and the possibility during the "overlap" of one cylinder pulling the charge from another would be considerably lessened in an engine of five cylinders. Cars fitted with an engine of this type, with crankshaft somewhat off-set, and piston connecting rods as long as consistently possible, equipped with high-tension magneto, perhaps an extra complete magneto carried to replace, in emergency, would, it seems to the writer, be deserving of the attention of many a prospective buyer. Why not a five-cylinder car?

C. H. G.
LaCrosse, Wis.

Why five cylinders? Why not seven cylinders? There is just as much meat in the cocoanut.

Six cylinders are chosen for the reason that the kinetic balance is more perfect than can be, this necessary condition with five cylinders, or, for that matter, with any number less than six cylinders, from all accounts. In any event, the prime reason for using more than one cylinder is to attain the desired power in any given case, with the highest weight efficiency, that is to say, the desired power capacity, attended by the minimum weight. This prime consideration presupposes any number of cylinders—including 1, 3, 5, 7, or the even numbers 2, 4, 6 and 8.

When designers find it an advantage to use more cylinders, rather than increasing bore, of the smaller number of cylinders, they have to take into account two conditions, viz.: (a) static balance and (b) kinetic balance. The static balance is not difficult of attainment, since it demands symmetry of figure and equal weight at equal radii spaced 180 degrees. The weights do not have to be in the same radial plane for a static balance. It is even possible to arrange a static balance, with unsymmetrical shapes, by using balancing weights, but directly rotation is set up the static condition is displaced by the mass in motion, which motion may be uniform or it may be accelerating. For the condition of rest, equal and apposite weights of equal radii will remain at rest, even though they are not in a common radial plane. Directly motion is imparted, the difference in planes will assert itself, and lack of symmetry will introduce disturbing moments. The fifth crank, and its relation, would not balance an opposite force in any plane sufficiently to afford the real kinetic balance of the "six." In other than automobile work a five-cylinder motor is used, and evidently the difference in running balance is not so very great as to preclude the use of the "five," if the platform is stable, and if the weight in the base is so great as to assure a low center of gravity, etc.

Carbureters work well on eight-cylinder motors, so that there should be no insurmountable difficulties in connection with six cylinders. The off-set to the crank is a matter besides the number of cylinders.

All the accessories you name could go with any number of cylinders.

THE BOSCH MAGNETO IN THE VANDERBILT.

Editor THE AUTOMOBILE:

[1,653.]—In an effort to establish definitely the true cause responsible for the loss of a position of supremacy attained by the Chadwick in the recent Vanderbilt race, first reported as due to the burning out of a magneto, it has been learned that neither of the Bosch magnetos in use on the car during the race burned out. A report circulated to that effect has proven absolutely false, and since has been recalled by the Chadwick Engineering Works, which founded its first belief on erroneous information.

A searching investigation clearly proved that nothing but malicious interference in the mechanism of the magneto, by a wilful hand, with the apparent object of disabling either the magneto or the car, was responsible for the unfortunate handicap of the Chadwick.

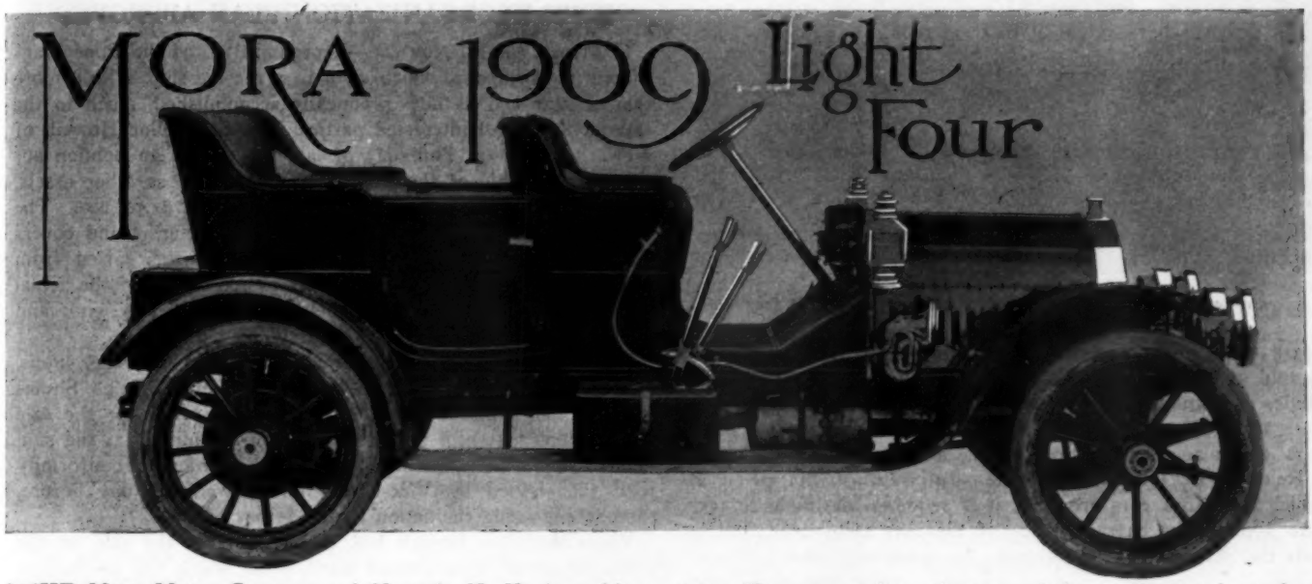
With reference to the Renault and No. 7 Matheson, both of which experienced ignition trouble during the Vanderbilt race, as was stated in the various trade papers, it is the general prevailing opinion that these cars were during the race equipped with a Bosch magneto, because this magneto is the standard equipment on cars of their manufacture. For reasons thus far not ascertained another make of magneto was substituted in this particular instance for the "Bosch" standard equipment. In the case of the Renault car, according to the printed statements, this substitution was accomplished the very night before the race.

It is thus evident that wherever ignition trouble was reported the Bosch product was not responsible. In all other cases where Bosch magnetos were employed, ignition gave as usual splendid results.

In simple justice to our product we would ask you to give this letter the prominence it deserves in correction of previous statements as appeared to the contrary in various publications.

BOSCH MAGNETO COMPANY,
New York City. E. H. Heins, Vice-President.

MORA - 1909 Light Four

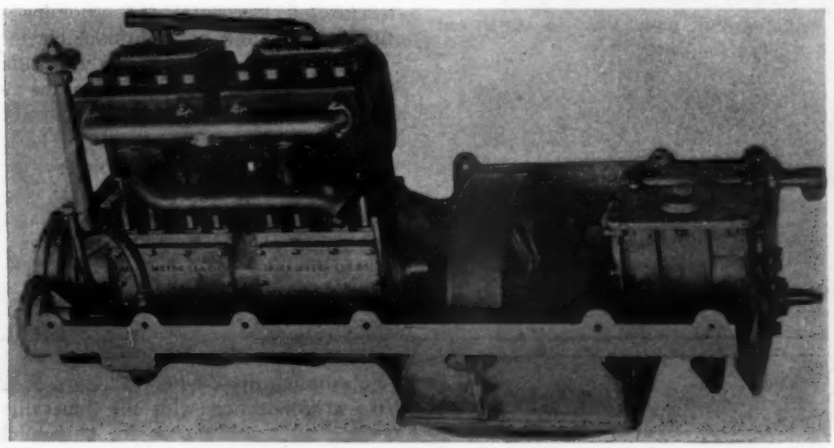


THE Mora Motor Company, of Newark, N. Y., is making adequate provision for the coming year by way of a light four-cylinder model, which will be turned out as a touring car or with a "racy" type body, to suit the individual taste. The company will also place at the disposal of the trade the same type of car fitted with a limousine. The illustrations accompanying this article will go a long way toward showing the nice arrangements, neat design and clean-cut work. These products are bound to attract a good deal of attention, because of a close conformity to the conventions and a certain well-defined selection of details in the design, backed up by precedent.

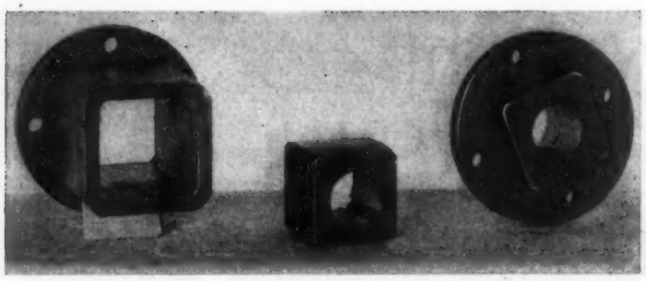
Some Features of the Power Plant.—In the motor the Mora Company has retained what it terms the unit construction aluminum pan, which has been a feature in its cars for the last four years. The company also points out that the power plant is substantially the same as that used in the "sealed-bonnet record car" in the past. The cylinders are 4 by 5 1-8 inches bore and stroke respectively, while the crankshaft is of the three-bearing type, with supports of liberal dimensions to the base of the pan. The rear end crankshaft bearing is 4 inches long, while the middle and front are 3 1-8 inches long. The pistons are of unusually long dimensions, with bronzed-bush piston pins, in turn held fast in the rod by a taper bolt. The motor is of the water-cooled genera, with a gear pump circulation and a cooler of liberal proportions, placed over the front axle. The ignition is by a four-unit coil, using a storage battery for the electrical supply, and the carburetion is well up to the usual Mora standard. The motor is rated at 24-28 horsepower, and is located under a neat and secure bonnet at the front.

In Relation to Transmission System.—From the leather-faced cone clutch to the three-speed selective change gear system the transmission shaft and other details are of rugged construction and clean design. The cast aluminum supporting pan, which has always been a feature of Mora cars, is here again in evidence, since it acts as a support for the transmission, as well as the motor. As the maker states, "it serves to keep the transmission and motor in perfect alignment." It also acts as a competent mud protector, and aids from the point of view of accessibility, which question of accessibility is also considered elsewhere throughout the car as well. From the transmission gear to the rear axle the power is lead through a hardened steel block, squared in the direction of rotation and rounded in the fore and aft plane. This block slides in a hardened steel casing, with a square hole, which casing in turn is fixed to the change-gear shaft. Through the bevel drive the power is transmitted to the live rear axle, and right here attention will be called to the provision of a neat adjustment by means of which the bevel pinion can be accurately mated.

Features of the Chassis.—Beginning with the pressed steel channel section drop frame, rigidly supported laterally, suspended on springs of adequate mass and neat design, the eye quickly takes in a straight line drive brought about by the use of the drop frame. Another look and the "I" section front axle intercepts the view, while the brakes on the rear axle are rendered conspicuous through use of 14-inch diameter drums. But if the brakes are large, they are no less efficient because of the use of equalizers, and the wheels are fitted with ball-bearings, with suitable provision for lubrication. The general appearance of the chassis is that of a well-designed car with semi-elliptical springs, front and rear, which general appearance, however, does not disclose a progressive series of nice details, as, for illustration, the emergency brakes interlock with the clutch, whereas the foot brakes do not interlock. The control, in other ways, is that which would give an autoist nothing to think about but the pleasure of riding, due in a large measure to the details of design of the tried-out carbureter, in which the single nozzle is concentric with the float and the regular air supply passing through little holes in the side of the nozzle chamber, with a cylindrical shutter placed to close these holes. The auxiliary air on the other hand is admitted to a spring-retained poppet valve. It was stated that the ignition is by a four-unit



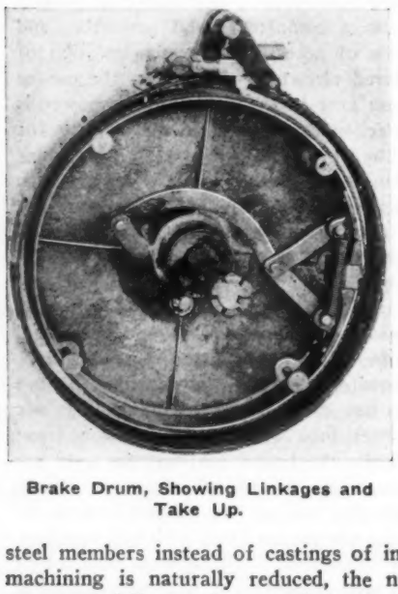
Mora World's Record Sealed Bonnet Power Plant.



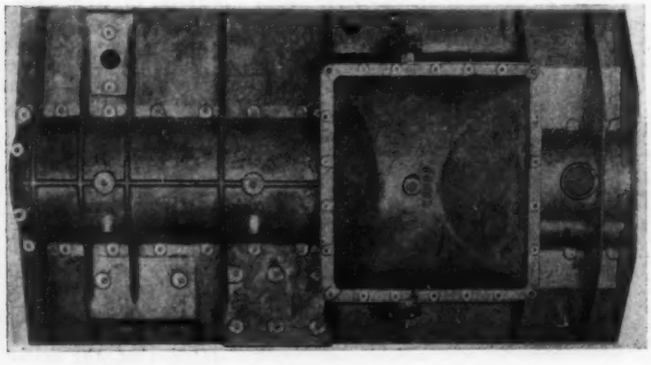
Universal Joint Parts, Showing Liberal Driving Faces.

spark coil and storage battery; this is only true when the car is sold at $1,850. At $2,000, the dual ignition then provided includes a magneto. In view of the excellence of the illustrations here afforded, and considering the sustained reputation of Mora cars, the balance of the story can be anticipated.

Relation of Quality to Price.—In view of the price at which the Mora cars are sold, it is rendered desirable to take into account the characteristics of the cars themselves, and to note the numerous refined details. In order to be able to appreciate the wonderful advance that has been made in automobiles, notwithstanding the trend in the direction of lower price, the very refinements to which reference is made must be taken into account and constitutes the best reason for a moderate price. Refinements in this case manifests itself by way of simplicity in design, the elimination of unnecessary parts, and symmetrical members that are more easy to make. By adopting die forgings, and pressed steel members instead of castings of inferior metal, the cost of machining is naturally reduced, the number of "wasters" are very materially cut down, and the purchaser gets a better automobile for less money. There are few experienced autoists who would fail to remember that divers of the improvements to be noted in this car were merely as unfilled wants when products cost twice as much as the amount named for this product, nor will their memory have to take them back more than three or four years at the best. In view of these facts, the Mora Company claims its product is on a high plane, due to consistent effort, aided by absolutely modern facilities.



Brake Drum, Showing Linkages and Take Up.



Plan of Mud-proof Aluminum Pan Construction.

POPE REORGANIZATION PLAN APPROVED.

HARTFORD, CONN., Nov. 23.—Reorganization of the Pope Manufacturing Company, which went in a receivership a little more than a year ago, is now practically accomplished, much to the satisfaction of all interested parties. Vice-Chancellor Howell, of Newark, N. J., on Thursday of last week, filed an opinion authorizing the sale of the Pope plants, and various other assets, to a reorganization committee for the sum of $1,500,000. The opinion of the Vice-Chancellor is somewhat lengthy and covers the situation thoroughly. But one objection was raised from the start, and that was by the holder of 100 shares of the actual par value of $10,000, and he held out to the very end, and contended that the offer was "grossly inadequate."

Charles E. Gross, of Hartford, counsel for Albert A. Pope, and George A. Yule, receivers, appeared before Judge Shumway, of the Superior Court, asking for an order for the sale of the Pope assets to the reorganization committee, at the sum named, and Judge Shumway passed the order in conformity with that issued by Vice-Chancellor Howell the day before, thereby endorsing the action of the Jersey official.

Vice-Chancellor Howell has also authorized the sale of the Pope company's Hagerstown plant, from which the mechanical equipment has been removed, for $57,000, and of the Elyria, Ohio, bicycle factory which is owned by the Federal Manufacturing Company, whose stock is the property of the Pope concern, for $35,000.

A. L. Pope, one of the receivers, expresses satisfaction over the outcome, and states that the New York counsel, Joline, Larkin & Rathbone, were arranging for applications for the sale of the assets to be made in two federal courts, at Boston and Baltimore.

Henry V. Poor, of New York, is secretary of the reorganization committee and the members of that body are Harry Bonner, Frederick H. Ecker and Augustus Hechscher. The plan of reorganization provides for the issue of $800,000 in six per cent. notes, secured by a first mortgage, $2,500,000 of six per cent. cumulative preferred stock and $4,000,000 of common stock.

The receivers will at once pay the final and fourth dividend of 25 per cent. which will clear up the company's indebtedness. Since the receivership the company has made good progress and the outlook for the future is regarded as very bright. The remaining plants owned and operated by the company will henceforth be conducted on a different basis.

APPERSON FACTORY TO BE ENLARGED.

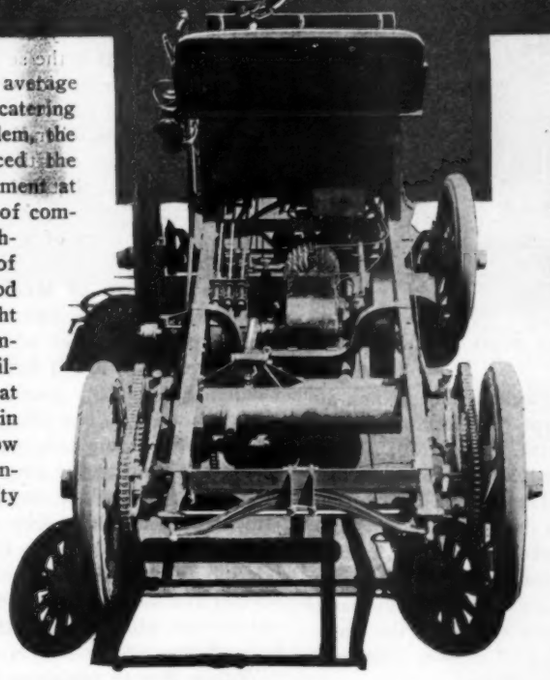
KOKOMO, IND., Nov. 23.—Plans have been approved by Apperson Bros. Automobile Company for the construction of a large three-story building, which will add 50 per cent. to the present available factory floor space, and work will be commenced at once on this addition and pushed to completion. Although the company owned sufficient available land for the new structure, it has purchased adjoining ground that can be so utilized as to allow of again doubling the plant at a later date.

While the Appersons are this year building a variety of models of various horsepowers and types, the two leading cars for 1909 are the new Model O, a four-cylinder 30-horsepower, selling at $2,450, and the new "Six-Forty." The latter, with the option of three-passenger body, baby tonneau, or five-passenger touring body, sells at $3,900. Sales Manager George H. Strout announces that the company has this year doubled the number of Apperson dealers, and has on hand unfilled orders and contracts for more cars than during any previous year. The company is now building a largely increased quantity of machines, and has been delivering 1909 models since August 1.

To Abolish the Crank.—Edward M. Agylman, of Janesville, Wis., in connection with the Janesville Machine Company, is working on a self-starter for automobile motors that promises overmuch, and for which he has applied for letters patent.

Knox Commercial Cars

DURING the years when the average automobile manufacturer was catering to the pleasure phase of the problem, the Knox Automobile Company placed the weight of their extensive establishment at Springfield, Mass., largely in favor of commercial automobiles. They approached this subject with a good deal of delicacy, realizing that, however good and serviceable the automobiles might be, it would still be necessary to convince merchants of their dependability under all of the conditions that are natural to the service, and in spite of a certain prejudice. How much of a problem it has been to convince merchants of the desirability of using automobile delivery wagons and trucks, instead of horse-drawn vehicles, is a matter that will never be understood excepting perhaps by the pioneers who made the attempt and brought it to a successful issue.



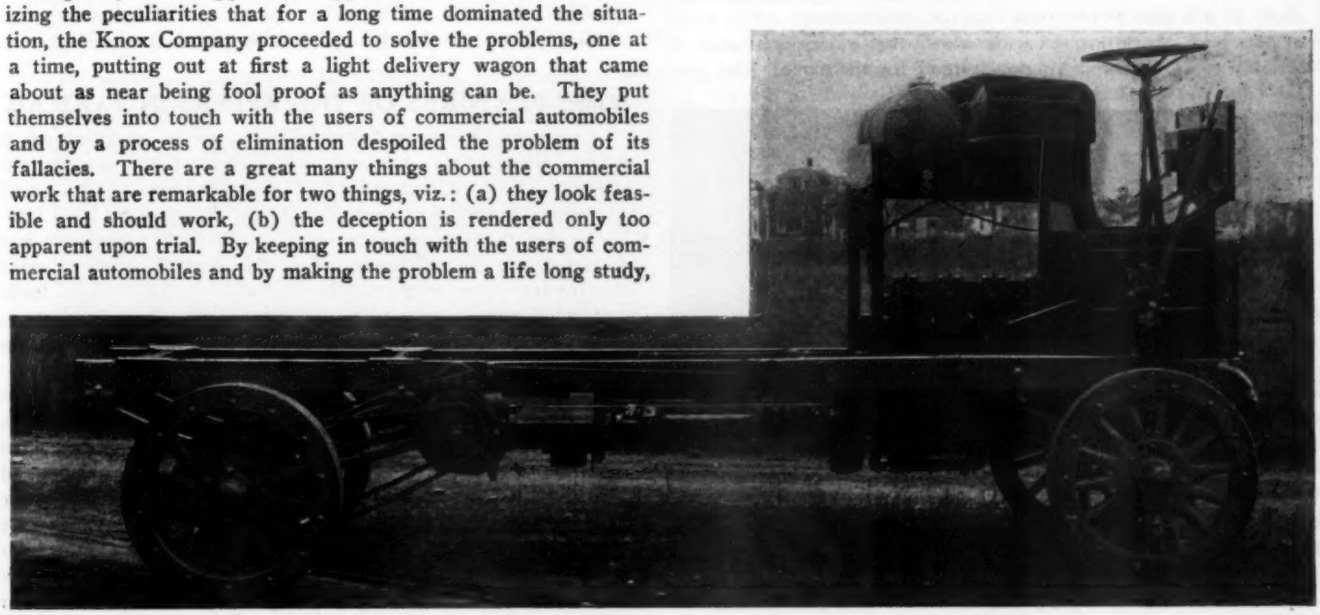
Model 20, Three-quarter-ton Commercial Chassis.

The Knox Company evidently fully appreciated the importance of gradually converting merchants to the idea of the automobile as a means of transportation, and they point out among numerous other conditions, the fact that the transportation managers of the big industries fully realize that horses have to be fed, watered and cared for; but they were horsemen and they were not able to understand that a machine had to be rested, cleaned, oiled and adjusted. Were they to consult a locomotive engineer (these transportation managers) they would be told that a locomotive has life, and wearies in operation just as does any animate thing, hence the locomotive has to be rested, and to be given a small share of the same careful attention as should be accorded an animal.

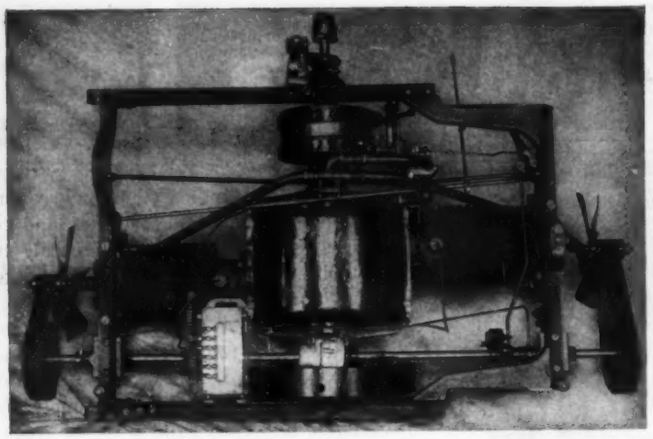
Simplicity and Ruggedness Applies to the Situation.—Realizing the peculiarities that for a long time dominated the situation, the Knox Company proceeded to solve the problems, one at a time, putting out at first a light delivery wagon that came about as near being fool proof as anything can be. They put themselves into touch with the users of commercial automobiles and by a process of elimination despoiled the problem of its fallacies. There are a great many things about the commercial work that are remarkable for two things, viz.: (a) they look feasible and should work, (b) the deception is rendered only too apparent upon trial. By keeping in touch with the users of commercial automobiles and by making the problem a life long study, as it were, the Knox Company were enabled to eliminate the fallacies and to reduce Knox trucks, not necessarily to the point, such as would seem to accord with the views of theorists who do not build trucks, but to a point consistent with the actual requirements to be found on investigation. The Knox Company point out that they did not simply investigate and then build a lot of trucks to fill a long felt want, whereas they did go slow. They built cars and they tried them out; they made the necessary modifications as the result of service and so on, until to-day the Knox line of commercial automobiles covers this zone of activity perfectly.

Model 20 Chassis Rated at ¾ Ton.—This article is illuminated by an illustration of the model 20 chassis, which is a well known and favorably received type of the Knox output. This type is turned out to suit express and other light service, limiting the capacity to 1,500 pounds, in which the merchandise platform is 44 inches wide and 84 inches long. The body may be covered or opened to suit the purchaser. This same chassis is turned out with a panel top delivery body in artistic effect, having the same platform area. The speed of this automobile is 15 miles per hour, with means of regulating the speed down to the lowest required limits. The tread is 56 inches, which is suitable for tracking on street car rails, and the wheel base is 85 inches, thus affording a short turning radius in congested streets.

The frame is angle steel 3x2x1-4 inches, with "I" section front axles of adequate proportions, while the rear axle is 1¾ inch square. Timken roller bearings are used for all road wheels, and the solid tires are 32x3 inches front, and 36x3 inches rear. Semi-elliptic springs are used.



Powerful Five-ton Knox Model 18, Which Is Equipped with Fifty-horsepower Water-cooled Motor.

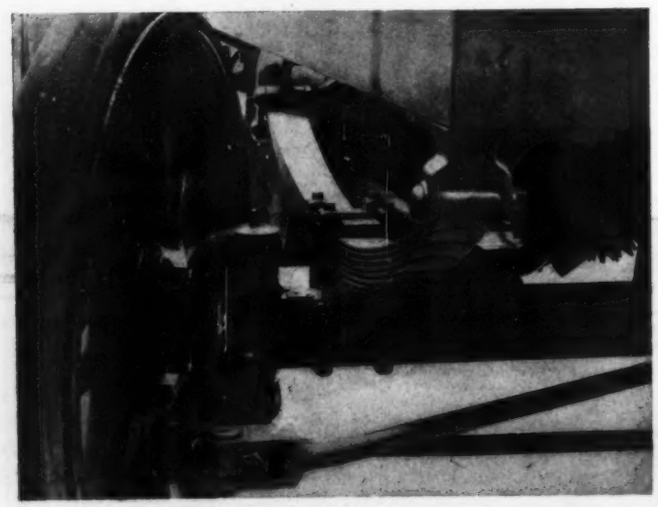


Two-cylinder, Twenty-horsepower Power Plant of Knox D-7.

The motive power is the product of a single cylinder Knox air cooled motor, delivering to a planetary type of transmission gear affording two speeds forward and reverse, thence to a double side chain drive. The clutch is incorporated into the planetary gear and the foot brakes apply thereto. The ignition is by means of a Connecticut coil and timer, utilizing dry cells, while a Lavingoiler, supplemented by grease cups, takes care of the lubrication. The balance of the equipment consists substantially of a horn and the necessary tools, odometer, a suitable gasoline tank, carbureter of course, while the mud guards as well as the leather trimmed operator's seat are provided with chassis, independent of the body.

Model 18, 5-Ton Truck Equipped with 50-Horsepower Motor.—This truck is the result of a positive demand on the part of merchants for a stout and commodious truck to be used in heavy goods delivery work. The standard platform of this truck is 72 inches wide and 14 feet 6 inches long. The wheel base is 154 and the tread is 67 inches. The truck is geared for 12 miles per hour and uses 36x5 inch solid front tires, with 36x4 inch "daul" solid rear tires. The front axles are 2½x4 inches, "I" section and the rear axles are 2¾ inches square.

The 50 horsepower motor of the water cooled type has four cylinder 5½ inches bore and stroke respectively. The Knox Company resorted to the use of water cooling in this large size, for reasons that are perfectly good and require no further comment. The illustration of the truck will indicate that the motor is situated in the front, in a getatable space under the driver's seat. It will also be observed that the cooler stands out in front of the body work proper with which the water circulation is suitably connected, and a pump is used for the same. The general design and construction of the motor are along lines consistent with the Knox practice, including the oiling system known as DeDion, involving an oil sump in the track case. The gasoline is by gravity feed from a round tank about the motor, back of the driver's seat. From the motor through the clutch to the transmission is by way of substantial, simplified means, and the transmission itself is the selective type, three speeds forward and reverse. The double side chain drive is used, and semi-elliptical springs of ample proportions serve to suspend a 5-inch channel steel frame. As in other Knox cars the road wheels roll on Timken roller bearings, and the chassis equipment is sufficiently complete to check with that as before stated for the model 20 chassis. In this truck, however, there is one essential difference, i.e., the ignition is by means of a magneto, supplemented by a coil and dry cells.



Front Axle and Spring Construction of Knox D-6.

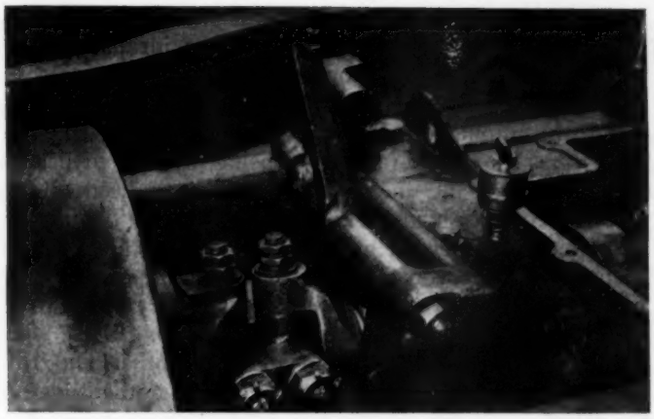
Some Features of Model D-7 Power Plant.—The illustration shows a double opposed air cooled motor, characteristic of the Knox methods, in which the air cooling is very effective. This power plant is self contained, mounted on its own frame, including a planetary transmission with the clutch and speed changes integral. The oiling system is by pressure feed, mounted on the same frame and two fans (one for each cylinder head) are set to pour an air current over the cooling surfaces. This separable power plant may be quickly dropped down and substituted by a new one when desired, thus rendering it feasible to quickly and cheaply make repairs, without keeping the automobile out of service during the interim of repairs. In this way several commercial automobiles may be kept in quite continuous service, utilizing one extra power plant, the same to be kept in good repair and to serve as a supernumerary.

With a view to rendering the subject a little more clear, an illustration of the front axle and spring suspension of one of the Knox types of delivery automobiles is given, which in itself is sufficiently clear to render any further statements and explanations thereof unnecessary. There are certain features that are common to all the Knox products as for illustration, the "wheel steerer" is used on all the models. The side levers are placed to the right of the driver, and in a nice relation. While adjustments are rarely necessary, provision is made for easy access to such parts as may possibly require attention in the course of time. This latter condition is in spite of the fact that the whole power plant can be removed in some of the models, even when repairs are necessary, and on the whole it is the claim of the Knox Company that it has been guided by actual experience, spread over a wide range of commercial pursuits, and that if it has eliminated any features that would seem to be of value, it was influenced by actual experience in harmony with the best phases of theory, modified by practical considerations.

SOME FEATURES OF THE APPERSON TAXICAB.

The regular Apperson "Model O" chassis is used, subject to such modifications as the wide experience of the makers, the Apperson Bros. Automobile Company, Kokomo, Ind., would naturally indicate. To assure continuity of service, a dual ignition system is used, incorporated into which is a magneto and a storage battery auxiliary. For the control, a three-speed selective transmission gearset is used, and the shaft drive leads to a "full" floating rear axle. Of the wheels, there is much to be said in their favor, since they are "dished," and the design is such that the weight is carried on "plumb" spokes.

In view of the modern chassis, it would not be out of place to expect body work of some pretentions. In this relation it is not to disappoint the reader. The body work is of the most modern description, by way of a stylish landaulet, upholstered in fine leather with broad cloth head linings. The top may be pushed back at will, and the design is such that all the windows are concealed within the body work, and the window frames fold down. The taxicab complete sells for $3,000, and while it is primarily a taxicab, it is nevertheless suitable for town-car service, and may be equipped accordingly.



The New Gear Box of the 1909 Darracq Taxicab.

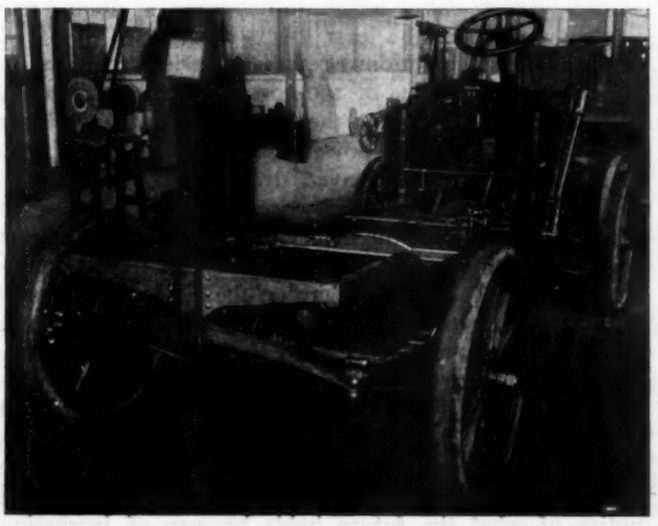
NEW DESIGN FOR 1909 DARRACQ TAXI.

PARIS, Nov. 20.—For 1909 a complete change of design is made on the Darracq taxicabs, well known in the States by reason of their extensive employment in most large cities. The gear-box on the rear axle, which is one of the distinctive features of the Darracq taxi, has been found unsatisfactory for the rough work these vehicles have to perform. It has, therefore, been removed and placed in the usual position to the rear of the engine, and on the subframe carrying the entire power plant. The selective gear change has been abandoned in favor of the straight through type, giving three speeds forward and reverse.

The most important change is in the clutch control. A broad leather-faced cone clutch is still employed, but the spring, instead of being within the cone, is now inside the gear-box and separated from the clutch by means of a stout universal joint. Any slight deformations in the subframe, or a little error in lining up, will not now prevent the proper working of the clutch. The spring itself is contained within a stout tubular housing carrying the thrust bearing, but prevented from turning in the forward extension of the gear box in which it is housed by means of a suitable stud. The clutch pedal operates direct on the outer face of this housing by means of a couple of arms, one on each side of the shaft.

The engine is slightly smaller than last year, but has undergone practically no changes in design. Lubrication has been rendered automatic by the adoption of a Dubrulle dashboard lubricator positively driven off the camshaft. There are two feeds only to the crankchamber. On the previous models the flow of oil was assured by pressure from the exhaust. The engine is in one casting, with valves on one side, and intake and exhaust manifolds integral. There have been a few minor changes on the carburetter, the air inlet being mechanically opened at the same time as the gas intake, in order to abolish the "panting" which sometimes occurred on opening out the engine suddenly after being throttled down. Brake connections have been simplified and are now entirely mounted on the subframe. The brake drums, too, have been increased in size, and are now of the same diameter as those employed on the 60-horsepower cars. Compared with the touring models, the chassis is a particularly robust construction, being considerably deeper and of broader section than any other models produced by the firm.

From the gear box the drive is taken to the rear wheels by means of propeller shaft, differential gear and rear live axle, all of a much stouter construction than on the touring models. A single-torsion rod is carried from the differential housing to a point on the subframe.



Chassis of the Darracq Taxicab for Coming Season.

THE FRANKLIN'S UNENCUMBERED DASH.

A feature of the Franklin models for 1909 will be an unencumbered dash. As will be seen by the illustration the dash is clear of oilers, coil boxes, wires, switches and other devices, and only the magneto button, needle valve stem, and primer rod remain. The oiler is now placed next to the engine base, where it is operated through gear connections with the driving shaft, and the oil is kept fluid by heat from the engine base. The ignition of the Franklin is such as to require no coil box.

New Dashboard of the Franklin.

The toe board is an auxiliary convenience, made as it is in three pieces, easy of removal. These are cast aluminum plates, held in position at the bottom with pins, and at the top with thumb catches. The steering column is free from all levers, the spark and throttle control being operated through the center of the steering tube, the center of the steering wheel forming the base for its operation.

The dash for the six-cylinder cars is made of mahogany; that for the others is finished to correspond with the rest of the automobile. The manufacturer, the H. H. Franklin Manufacturing Company, Syracuse, N. Y., feels confident that the new dash will meet with popular favor.

THE TREND IN WARNER INSTRUMENTS.

The Warner Instrument Company, of Beloit, Wis., has placed on the market a new style auto-meter. The shape is similar to that of an alarm clock, 4 inches in diameter and 2 inches thick. There are four openings on the face, one giving the number of miles traveled on the trip, another the total number of miles traveled since the instrument was started, the third giving the speed per hour, and the fourth is a receptacle for a small electric light bulb to light up the dial at night. It will register 10,000 miles, and a turn of a handle places it back at zero.

THE AUTOMOBILE

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H. M. SWETLAND, President

EDITORIAL DEPARTMENT
A. G. BATCHELDER, Managing Editor
R. F. KELSEY, Associate Editor C. B. HAYWARD, Engineering Editor
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BUSINESS DEPARTMENT
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LOUIS R. SMITH FRANK B. BARNETT
W. I. RALPH, 1035 Old South Building, Boston, Mass.
C. H. GURNETT, 1200 Mibhigan Ave., Chicago, Ill.

Cable Address - - - - - - - - - - - - - - - - Autoland, New York
Long Distance Telephone - - - - - - - - - - 2046 Bryant, New York

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LICENSE THE DRIVERS OF ALL VEHICLES.

The drivers of all vehicles should be licensed. Then police control of traffic in New York and other large cities would be as absolute as it is in London, where the finger of the "Bobby" can stop the progress even of a king. That is the idea of an ex-police commissioner of the metropolis, and the common sense of the proposition is so apparent that it is strange the plan has not been duplicated in this country before.

In the large cities, and especially in New York, Chicago, Boston, and Philadelphia, street traffic of all kinds has assumed such huge proportions that the dangers to the users of the road have multiplied astoundingly, as is shown in the increasing number of accidents. If "every driver of any kind of a vehicle" had to have a license, which was revocable temporarily or permanently, there would be more consideration and a quick decrease in recklessness of those entrusted with the guidance of horse-drawn or motor-driven vehicles.

Before a law of this sort can be put into effect in the average American city, there inevitably must come the creation of a sentiment in favor of it which will convince the politicians that the general public demands it for the common good. There will come a prolonged resistance from the thousands who now guide horses through the crowded streets without any examination as to their qualifications, and whose utter incapacity frequently finds demonstration in the accident reports in the daily papers.

But the automobilists should no longer hesitate to place themselves squarely on record as being in favor of licensing all drivers and the revocation of such licenses for culpable conduct in their use of the streets. The public has been longsuffering, but has reached the limits of its forbearance, according to the signs of the times, and while purging their own ranks, the autoists can see to it that the drivers of horses are included among those who must give more consideration to one another and the man who must cross the road to get on the other side of the street.

* * *

PREJUDICIAL RESISTANCE IN AUTOMOBILES.

The mechanical losses in any automobile may be resolved into two components, viz.: The losses that follow functional activity along lines consistent with the advantages mutual to necessity considering correct design, and the losses in excess due to eccentricities in design. This latter series of losses might well go in the category of prejudicial resistance, or be eliminated.

To what extent prejudicial resistance holds sway in automobiles in general, is a matter that must in the long run receive some attention. If it amounts to as much as 10 per cent. of the power of the motor, it is a large factor, since the fuel required is in the ratio of 100 to 16. In other words, to realize 16 horsepower at the flywheel, fuel to the value of 100 horsepower must be supplied. If 10 per cent. of this goes to prejudicial resistance, inherent in the design, it is a matter of 10 horsepower in fuel to be noted, rather than 1 6-10 horsepower, as might be supposed by those who fail to keep track of the inherent value of the fuel, instead of the mechanical losses.

But there is one other source of prejudicial resistance that sinks the foregoing into peaceful slumber, as a bottle of milk sways the consciousness of an infant. The inequalities of inferior roadways furnish prejudicial resistance on a large scale. The average town car will do well with a 16 horsepower motor, whereas the same car on touring duty over the unkempt roads of America would scarcely make adequate headway on double that horsepower to say the least.

Under these conditions prejudicial resistance foots up to the enormous value of 100-horsepower in gasoline, all of which is chargeable to the ill-kept roads that indicate the need of double the power to do the same work in a satisfactory manner on paved streets.

The average road commissioner is so busy trying to invent a theory to fit the ability of rubber tires to agitate the top dressing of his ill-made roads that it will doubtless be a task to enlighten him on the subject sufficiently to enable him to understand that prejudicial resistance costs the community more than the cost of good roads. Roughly, the extra gasoline required for the 60,000 cars that the State of New York has on license, assuming that each car does 10 miles per day for 300 days per year, would cost enough to pay 4 per cent. on more than one hundred million dollars per annum, which is to take no notice of what the future holds by way of increasing numbers.

EX-POLICE COMMISSIONER WOULD LICENSE ALL DRIVERS

WILLIAM McADOO, a former New York City Police Commissioner, and before that Assistant Secretary of the Navy and also a Congressman, was one of those who spoke at the recent presentation of the Vanderbilt Cup. In his witty and novel interesting speech Mr. McAdoo devoted his remarks largely to the traffic problem and a discussion of how the inevitable and lasting automobile was to be regulated by law. He declared that the solution of the question lay largely with the autoists themselves, who had the power to compel reasonable laws and should have the public spirit to obey them.

"I do not know," said Mr. McAdoo, "whether it was Shakespeare or Roosevelt who said that men must play many parts. I have been a legislator, a sailor and a Police Commissioner. I must say that I felicitate myself that I am no longer a Police Commissioner when I gaze upon this assemblage of 300 lawbreakers, with an average of $100 in fines. I am prouder of what I have done to regulate traffic and make the streets safe than anything I may have accomplished. I am proud to have been the one to have established the Brooklyn Bridge safety zone.

"I have been studying traffic control in London this summer from a New York point of view. You autoists and the Burglars' Union are trying to undo the police. I am getting more acquainted every day with the underworld, for you autoists are the greatest aggregation of law-breakers on earth; I will say, however, you are a fairly intelligent lot of law-breakers. One of my first acts as Police Commissioner was to change the caps of the bicycle cops to white. Then the West End Association gentlemen came and told me that the autoists would see the white caps and slow down, and I replied that that was just why I put the white caps on the cops, and if I were Police Commissioner now I'd put red lights on them at night."

Mr. McAdoo then recited a hold-up that the Riverside cops had once made on him, and used it as a text to show how policemen seek to get a record and square themselves for not being on their jobs by filling up a record of arrests made.

"Efficiency in a cop," he continued, "does not consist in making arrests, but in showing good judgment. My idea is to let automobilists hit it up a bit when the road is clear, and hold them down under the limit when the children are coming out of a schoolhouse. (Great applause.) I don't believe in police traps or making arrests. I want the policeman who makes no arrests, but is on his job all the time.

"The London rate of speed is higher than our own, despite the more crowded traffic. One-fifth of our accidents come from violating the law in turning corners. In London they make them turn the corners wide. Our own corner curbs are ground down by illegal short turning. Homecomers tell of the power of the upraised finger of the London 'bobby.'

"The reason for this is that in London *every driver of any kind of vehicle is licensed.* When you ask him to show his license, you have command of the man's living. To regulate traffic in New York properly the police will have to get absolute control of the streets. The mounted cops are the first, the greatest step in this direction. We need to get civilization out of barbarism. The automobile is a part of our civilization of to-day. It is here to stay, and you yourselves must be the ones to curb the reckless.

"I believe that the American automobile is to be the automobile of the future. In the early days of bicycling it was more fashionable to ride a Humber. That was all changed, and with our automobiles, as with our bicycles, we will dominate the world, and before long, mark my word, it won't be fashinable to own a foreign automobile."

TWO IMPORTANT LEGAL DECISIONS IN PENNSYLVANIA

PHILADELPHIA, Nov. 23.—Local automobilists were naturally delighted when, some days ago, Judge Weand in the Montgomery County Court, at Norristown, released an autoist who had been arrested on the charge of overspeeding, the evidence showing that a car bearing the number set alongside his name in the records of the State highway department at Harrisburg had broken the speed laws of Lower Providence township. The judge had based his action on the failure of the prosecution to show that the owner of the car (the purchaser of the tag) had been in the automobile at the time. This decision makes it incumbent on the "trap artists" to prove that the owner was in the car at the time of an alleged offense.

But as if this blow at the roots of a well-paying industry were not enough, Judge Wilbur F. Sadler, in the Cumberland County Court, at Carlisle, last week added to the "trap artists" woe by handing down a decision to the effect that an arrest and fine based on speed made over a measured quarter or half mile, or, in fact, over any other distance than a mile, is illegal. This case also originated in the Montgomery county "trap" district. Albert E. Cauffman, chauffeur for John Kays, a Carlisle attorney, was timed by the "trappers" over a measured quarter, and the calculations having figured out a rate in excess of the limit, a constable was sent to Carlisle who arrested Cauffman. The latter's employer fought the habeas corpus proceeding, and when the evidence was all in, Judge Sadler ruled that it was necessary to give proof that one full mile—the distance specified in the law—had been traversed in less than the State limit (three minutes in the open country and six minutes in built-up sections). The court also read a lecture to justices of a county who make a habit of issuing warrants for service on alleged violators who live outside that county, saying that the law gave them no license to do so. He held, also, that actions for auto speeding are civil or penal, rather than criminal, and that the State cannot be a party to the action. Cauffman was discharged.

These decisions gave evidence that the campaign of the Automobile Clubs of Philadelphia and Norristown, to put a stop to the illegal arrests and finings in Montgomery county, is already bearing fruit.

NEXT YEAR'S GRAND PRIX IN CHATEAULAND

PARIS, Nov. 20.—Angers, in Chateauland, has been officially selected the scene of the 1909 Grand Prix and voiturette race to be held the end of June or early in July. The decision was taken this week by the Racing Board, and immediately confirmed by the full committee of the club. In return for holding the race in their district the local authorities are under an obligation to raise a subvention of $20,000 and to assist in much of the detail work of preparing for the big event. Already the Angers committee has shown a considerable amount of activity, and when they put forth their candidature, presented plans of a suitable plot for grandstands and ravitaillement posts, together with options on the rental; a complete plan for the barricading of the road, with contracts for the work by local firms; options for various plots of land around the course, a guarantee that drinking

water would be supplied, and prices for transporting it; also a written statement from the roads department that the entire course would be put into condition for racing early in the new year.

The Racing Board has become wise as the result of years of experience in organizing races, and this year has withheld its decision until terms had been arranged for the rental of every plot of land, and for every piece of work that will have to be accomplished. As there are a dozen districts desirous of obtaining the race, competition makes it impossible for overcharging to be indulged in. It is declared that the club has also on foot a big scheme by which all the hotel proprietors will agree to a fixed tariff for food and lodging during the period of the races.

It is roughly a triangular course 46.18 miles round that has been selected on the banks of the Loire, to the west of Tours and Saumur. As, in all probability, ten rounds will have to be made, the total distance will be 461.9 miles. The voiturettes will probably be required to cover six rounds, or a total distance of 277.08 miles. Although one side of the triangular course is rather narrow and winding, fast time can be made, and even with the 130 millimeters limit an average of 70 miles an hour is anticipated.

Only one matter in connection with the annual race now remains to be settled: whether tires shall be changed by hand or with the aid of dismountable rims and wheels. The International Association was unable to come to a decision on the point and left the matter over to another meeting to be held in Paris during the Salon. The majority of those interested appear to favor the use of both dismountable rims and wheels.

THE 1909 INTERNATIONAL RACING RULES.

By A. L. RIKER, Vice-President Locomobile Company of America.

ALL racing cars built abroad for the season of 1908, by virtue of an international ruling, were restricted in design as to their cylinder bore. For the Grand Prix and other events intended for large cars the bore was 6.1 inches; for the English Isle of Man contest the limitation was 4 inches—thus the name, "Four Inch Race." Similarly, the bore of the cars constructed for the small-car race run on the day preceding the "Grand Prix" were restricted. In spite of these limitations, the cars were speedy, and notably high averages were made. In fact, the average time made by the winner of the "Bresia circuit" is a new record, faster work than has ever been accomplished before with a motor of unlimited bore or stroke. The Grand Prix was won at an average of 69.2 miles per hour; the Voiturette race the day before the Grand Prix at an average of 50.02 miles per hour.

At first thought it would appear that the tendency to limit the size of racing motors in this manner is most admirable, but when a study is made of the strokes of the foreign racing cars of 1908 it would appear that many of the motors are in reality freaks, particularly when it is considered that the short-stroke motor is gaining ground all the time, and that a few years ago, when the bore was unlimited, the foreign designers made the short stroke in preference.

For 1909 the Europeans have decided to reduce the bore still further, from 6.1 inches to 5.1 inches. It was hoped that some limit would be placed on the stroke, because The Automobile Club of America, in reply to the request of the racing powers abroad, advised a classification by volume, a most sensible thing. The wisdom of this plan would be obvious to all; it not only places four and six-cylinder motors in the same class, but it encourages rational motor design and the building of cars that will have a commercial value after the race.

A four-cylinder motor of 5.1 bore and a reasonable stroke, say six inches, is a very good size, and a manufacturer could easily turn such a racing car into a stylish and speedy roadster with little trouble, and the result would be a car that could contain all the value the race could offer in the way of experience, and instead of being a freak would be a logical new model, perfectly tested. Just what a 5.1-inch motor with an extravagantly long stroke would be good for after the racing season, with the rules changing every year, is difficult to see.

The foreigners can very well afford to build such cars, owing to the large number of events held every season that are open to just such specially built racing cars; moreover, the motor car advertising on the continent is largely limited to contestants, and the makers can affort to go to greater expense than we, as they do not have so many automobile shows, do not have to do so much advertising in the newspapers and magazines—and, what is more important, the advertising they do is highly effective, owing to the relatively small and densely populated areas as compared with the United States.

The point might be made that a few of the racers built abroad for the 1908 racing season did not have abnormally long strokes. It is reported that the winner of the Grand Prix had cylinders of 6.09 inch bore and a stroke of 6.68 inches. But it must be considered that 6.1 inch bore is large and a real racing dimension, and it was not found necessary to lengthen out the stroke very much. Now for 1909 the bore is greatly reduced, and in order to make a fast car the designer is almost certain to build a very long stroke motor, like the cars in the Four-Inch Race in England or the Voiturette Race in France.

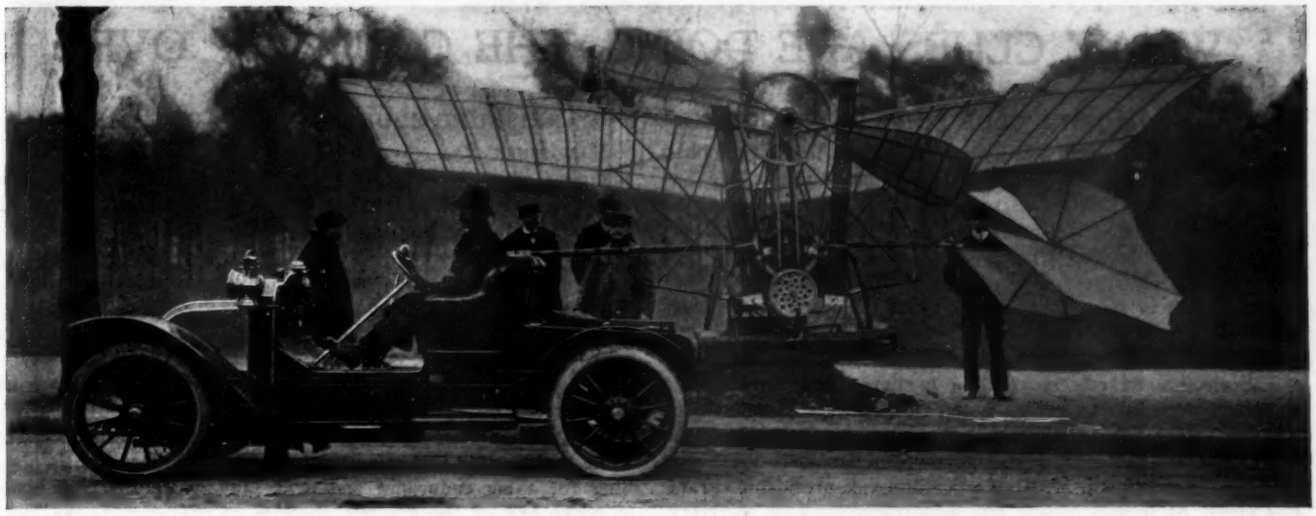
What is the position of the American manufacturer to-day who has a desire to build a car that can win the Grand Prix of 1909? Simply this: He must build for racing purposes only one or more freak cars. He cannot compete with the foreigners unless he does; if he does not lengthen out the stroke to some absurd point his cars will not have the speed of the foreign cars; he will not be racing on equal terms with them, and he will be beaten.

What, then, will be the attitude of the automobile public toward American manufacturers who are in sympathy with racing, experienced at it, but who do not care to build freaks, from whose motor performances they will learn little or nothing? Most likely it will be considered that they are "dead slow," or unpatriotic, or afraid of the foreigners. Not in the least. The American builder has had nothing to do with the formation of the 1909 racing rule, beyond an unheeded protest made by him through the medium of the A. C. A.

Is it too late to gain a reversal of the rule? If the volume could only be limited instead of the stroke it is certain that a large number of splendid fast American racers would be built, and their performances would prove the mettle of the American designer in a more impressive and conclusive manner than ever before. The present situation is more than unsatisfactory, but if it can be explained and thoroughly understood there is that much accomplished.

PENNSYLVANIA ROAD BUILDING LOOKS GOOD.

Harrisburg, Pa., Nov. 24.—In the annual report of the State Highway Commissioner of Pennsylvania, Joseph W. Hunter, made public on Monday, there is contained a recommendation for an annual appropriation of from $4,000,000 to $5,000,000 a year, for ten years, to build roads and to outline a system of main highways for the State. During the year 325.2 miles of roads were completed and 221 miles were under contract. During the present year much of this work has been completed, and Pennsylvania now boasts of over 700 miles of State road, with petitions in for the coming year for almost that much more road, and prospects of a great increase if the legislature passes a bill allowing a larger appropriation.



Santos-Dumont Off to St. Cyr with His New Aeroplane Strapped to His Runabout.

SANTOS-DUMONT TO FLY AGAIN IN NEW AEROPLANE

PARIS, Nov. 20.—Santos-Dumont, the first man in Europe to make a mechanical flight, has returned to the flying game after an absence of over a year, his new machine having the record of lightness and smallness. It is a tiny monoplane that has been christened the *Butterfly*, but which might have been more correctly termed the *Dragon Fly*. The two wings, only 16 feet from tip to tip, and formed of a wooden frame covered with fine varnished silk, are mounted on a metal framework carried by three bicycle wheels. The motor, not more than six inches from the ground, is an eight-cylinder 24-horsepower Antoinette, driving a two-bladed propeller, also of wood and silk, by means of a broad belt. The driving pulley is keyed to the fore end of the engine shaft, and the driven pulley is three feet above it in the angle formed by the two wings. The speed of the propeller is 700 revolutions a minute. Two packets of plain aluminum tubes mount up on each side of the engine and the propeller for the circulation of the cooling water. The pilot's seat is immediately behind the engine, and under the wings, not more than five or six inches from the ground.

Compared with Farman's aeroplane, the Santos-Dumont is but a toy, for the former has a bearing surface of 195 square feet, while the latter has but 29. To prove the handiness of his flying machine, Santos-Dumont dismounted the long bamboo tail carrying the rear rudder, mounted the whole apparatus on the rear platform of his little two-cylinder runabout, and drove off with it to St. Cyr, 12 miles away. The first attempt at flight resulted in the breakage of one of the wheels. The Brazilian aeronaut declares that he hopes to have his machine thoroughly tuned up and be in proper condition for the first aeroplane races to be held at Monaco next January.

BORDEAUX-PARIS AEROPLANE RACE.

PARIS, Nov. 20.—Still another aeroplane race for 1909, the latest event to be run from Bordeaux to Paris, distance by road 329 miles, in five daily stages of about 60 miles each. The stages are Angouleme, Poitiers, Tours, Orleans and Paris. There is a certain historic charm to the French in holding an aeroplane race from the western wine city to Paris, for it was between these two towns that the world's first automobile race was ever held, when Levavassor drove continuously for almost 49 hours, away back in 1895, and where De Knyff, Henry Fournier, Charron, Louis Renault, Farman and Girardot struggled for victory in 1899 and 1901, and where many an automobile and bicycle race was held during that "heroic" period when France was always on top.

No regulations have yet been drawn up for the aeroplane race, nor has the date been fixed, but it is believed that the race can be held during the summer of 1909, or at latest in 1910. The difficulty at present is not the lack of aeroplanes, for there are without doubt 250 flying machines under construction in and around Paris, but the need of men to pilot them. Apart from Wright, Farman, Delagrange and Bleriot, there are very few men in France who have had any experience aloft, and if some of the races projected for the coming season fail to materialize it will be entirely because of this lack of experienced men.

An aeroplane race across Paris, which was announced by *L'Auto*, has been withdrawn in favor of Bordeaux-Paris, the organizers recognizing that it was dangerous to the general public to invite flying machine pilots to pass over a crowded city.

AERO CLUB OF NEW ENGLAND MEETING.

BOSTON, Nov. 23.—The Aero Club of New England on Saturday evening celebrated its first anniversary, and incidentally observed the 125th anniversary of the first ascent by man in a balloon, with a dinner at the Boston City Club. There was a good attendance of members and a number of guests whose fame as aeronauts is international. Professor A. Lawrence Rotch presided, and the speakers included President A. Holland Forbes, of the Aero Club of America, and Augustus Post, who competed in the recent international race in Germany; N. H. Arnold, also a competitor in the international race; Mayor George A. Hibbard, of this city; Charles J. Glidden, W. K. Morrison, of Minneapolis, who recently made an ascent of 11,100 feet; and Vice-President T. E. Byrnes, of the New York, New Haven & Hartford Railroad. Letters were read from Professor Alexander Graham Bell and Orville Wright.

Before the dinner a business meeting was held, at which the following officers were elected: President, Professor W. H. Pickering, of the Harvard astronomical observatory; first vice-president, Frank E. Stanley; second vice-president, Frank B. Comins; secretary, Alfred R. Shrigley; treasurer, Harry G. Pollard; directors, Professor Pickering, Vice-Presidents Stanley and Comins, Henry Howard, T. E. Byrnes, W. P. Harris, and Winfield S. Shrigley; foreign representatives, Professor Rotch, Charles J. Glidden and J. C. McCoy; contest committee, Henry Howard, W. E. Eldredge and Henry A. Morss; ascension committee, Charles J. Glidden and H. H. Clayton, of the Blue Hill observatory; aeronautical engineer, Leo Stevens.

WHAT CLUBS ARE DOING THE COUNTRY OVER

NEW AUTOMOBILE CLUB FOR SAN FRANCISCO.

San Francisco, Nov. 19.—Automobiling in this city took a new lease on life last night, when the organization of the San Francisco Motor Club was completed and officers elected. A number of the younger element among the trade and also owners in the city felt that they wished an organization which should be primarily for pleasure and promoting of touring and speed contests, and not in any way to conflict with the work of the older clubs at present doing such good work for road improvement and posting of highways.

The election of officers resulted in Fernenado Nelson, who has twice lowered the record between San Francisco and Los Angeles, being chosen as president. Charles S. Howard, the head of one of the local automobile companies, is first vice-president, and William M. Klinger, second vice-president. Frank E. Carroll, of former bicycle and motorcycle fame, is secretary, and C. E. Starrett, treasurer.

With the completion of the election of officers the club immediately proceeded to lay its plans. Tony Nichols, as head of the contest committee, brought up the subject of an annual road race, and reported that he thought by careful management the county supervisors could be interested in the scheme, especially so, if the club was willing to give the profits of the race towards road improvement. It was decided to hold a short run to one of the many picturesque spots near the city before the Winter rains set in, making it a sort of picnic outing, the object being to bring all the signers of the constitution together.

WEBB NOMINATED FOR L. I. CLUB PRESIDENCY.

Brooklyn, N. Y., Nov. 23.—Frank G. Webb, vice-chairman of the A. A. A. racing board, has been placed in nomination for the presidency of the Long Island Automobile Club. Nominations for other officers to be voted for at the annual meeting of the club, which will be held December 10, are as follows: Vice-president, William Schimpf; secretary, Herbert G. Andrews; treasurer, Charles C. Cluff; governors for term of two years, Alfred Wilmarth, Dr. A. C. Howe, and Charles Jerome Edwards; membership committee, Walter L. Webster, William G. Morrison.

The nominee for president, Mr. Webb, is one of the best known automobilists in the United States, and has served with great credit and efficiency on the racing board of the American Automobile Association for several years. He will make a capable official at the head of the club, and his nomination will prove deservedly popular.

The annual dinner of the club will be held Thursday evening, December 10, and will be of the nature of a "beefsteak feast," to be followed by a high-class vaudeville entertainment.

MILWAUKEE A. C. CLOSES OUTDOOR SEASON.

Milwaukee, Wis., Nov. 23.—Nine machine loads of members of the Milwaukee Automobile Club participated in the last tour of the season on November 21, the occasion being the western championship football game between Chicago and Wisconsin at Madison, Wis., and the institution of the Green County Automobile Club into the Wisconsin State A. A. affiliated with the A. A. A. Ten other machines accompanied the nine as far as Madison to see Wisconsin get its annual whipping, this time by the score of 18 to 12. From Madison the nine machines went to Monroe for the jollification and returned to Milwaukee Sunday night.

The club is planning to keep the interest up during the winter by a series of indoor events with the hope that when spring comes and the new clubhouse is ready for occupancy the membership will be materially increased.

HARRISBURG CLUB PLANS ROADS CAMPAIGN.

Harrisburg, Pa., Nov. 23.—The Motor Club of Harrisburg is planning an active campaign for the betterment of roads in Pennsylvania, and has elected one of its vice-presidents, C. C. Cumbler, as a member of the Legislature, while the other three members of the county of Dauphin are pledged to support all fair bills for good roads and especially an increased appropriation for the road building work.

The Motor Club has recently erected over one hundred sign boards throughout the surrounding country, showing the way to and from the city to all outlying points in the State. This work was carried on by a special committee consisting of J. Clyde Myton, James McCormick, Jr., and Dr. John Oenslager. The contest committee through its secretary, W. R. Douglas, is planning for a big endurance test next May which the club hopes to make one of the greatest contests of the year in the East. Numerous promises of support have already been received.

ELMIRA AUTOMOBILE CLUB ELECTS OFFICERS.

Elmira, N. Y., Nov. 23.—New life was infused into the members of the Elmira Automobile Club at the annual meeting for the election of officers. The constitution and by-laws were amended, making the annual meeting in April, and reducing the entrance fees and dues. This was done in order to make it possible for every automobile owner in the city to become a member of the club. Elmira has as large a number of autoists as any city of its size in the country, and if the plans of the newly elected officers are carried out with the aggressiveness shown at the meeting, the club will have a correspondingly large membership in the near future. The following is the list of new officers: President, Clay W. Holmes; vice-president, F. N. Dounce; secretary, Fred H. Rees; treasurer, Edward B. Crocker.

HUB DEALERS AGAINST RECKLESSNESS.

Boston, Mass., Nov. 23.—Believing in the stand taken by the Springfield Automobile Club against reckless driving, a number of the Boston dealers have joined in the crusade by placing notices in their garages and repair shops warning all their drivers that any of them detected in the act of reckless driving will be discharged. The dealers recognize the fact that unless something is done to check the growing tendency of a few drivers to disregard the rights of others, more severe legislation will be enacted, which will only serve as a temporary setback to the progress of the automobile. They have taken this method of showing how they stand on the subject by doing all in their power to control the drivers over whom they have jurisdiction. The good work in this direction that has been inaugurated by the clubs should be emulated in every city where the trade is organized.

TO ORGANIZE FLORIDA STATE ASSOCIATION.

Tampa, Fla., Nov. 23.—At the recent meeting of the Tampa Automobile Club the most important subject which came up for discussion was the proposal, made by President Bryan, to organize a State association under the auspices of the American Automobile Association. Extracts were read from the rules of the national body relating to the formation of State associations. The plan met with such favor that a committee was appointed to confer with similar committees from the Jacksonville and Daytona clubs to carry the project to completion. The meeting was the largest in the club's history, and a great deal of interest was manifested in all the proceedings, especially so in regard to the plans of road improvement as put forth by the good roads committee.

MARYLANDERS HOLD THEIR FIRST HILL CLIMB

BALTIMORE, Nov. 21.—W. W. Lanahan, with his 60-horsepower Stearns car, carried off the laurels at Maryland's first hill climb, which was held under the auspices of the Automobile Club of Maryland. Out of the six events, Mr. Lanahan's car was the winner in three. In one of these, that for the free-for-all, his car made the best time of the day. The car, which was driven by Wilfred Smith, covered the distance of six-tenths of a mile in 43 1-2 seconds. The other events in which this car was the victor were Classes F and H. In the last race Mr. Lanahan was the driver, and he took the car over the course in 46 seconds flat. In the other event Mr. Smith made the distance in 45 1-2 seconds.

The Chalmers-Detroit cars made the next best showing, carrying off the first and second contests, their time being 1:03 1-2 and 54 1-2, respectively. The first event was won by this make of car in consequence of the actual winner, the 30-horsepower Stoddard-Dayton machine, entered by L. H. Shaab and driven by J. L. Cassard, Jr., being disqualified. Harry A. Tate, driver of the Chalmers-Detroit car, protested on the ground that the Stoddard-Dayton car had on it a magneto which was not included in the list price, and which would have carried the price of the car above that allowed for this class, $1,251 to $2,000. After an investigation, the judges decided in favor of the Chalmers-Detroit driver.

The hill on which the climb took place is the Belvidere avenue hill, between Falls road and Roland avenue, Mount Washington. It is an extremely steep affair, and it was necessary for the cars to make a change of gear on several occasions between the start and finish. The starts were all flying ones, and the trophies consisted of silver cups to the winners of each event. More than 2,000 people were lined along the course of the climb, while numerous autos were also to be seen along the way, which were filled with enthusiastic spectators. The summaries:

CLASS A—FOR CARS SELLING FOR $850 AND UNDER.

1.	Ford	15		Withdrawn

CLASS B—FOR CARS SELLING FROM $851 TO $1,250.

1.	Cameron	20		Withdrawn

CLASS C—CARS SELLING FROM $1,251 TO $2,000.

1.	Stoddard-Dayton	30	J. L. Cassard, Jr.	1:01 1-2*
2.	Chalmers-Detroit	24	H. S. Tate	1:03 1-2
3.	KisselKar	36	J. F. Heaver	1:05 1-2
4.	White Steamer	20	L. W. Tremblay	1:09
5.	Mitchell	30	W. P. Shuler	1:20

*First, but disqualified. Race given to Chalmers-Detroit car.

CLASS D—CARS SELLING FROM $2,001 TO $3,000.

1.	Chalmers-Detroit	40	W. C. Hood	:54 1-2
2.	Stevens-Duryea	24	Jack Sperry	:55
3.	KisselKar	54	J. L. B. Wilhide	1:04
4.	Winton	48	W. L. Duck	1:09 1-2
5.	Locomobile	20	Joseph Palmer	1:36

CLASS E—CARS SELLING FROM $3,001 TO $4,000.

1.	White Steamer	30	Harry E. Mayer	Withdrawn

CLASS F—CARS SELLING FROM $4,001 AND OVER.

1.	Stearns	60	Wilfred Smith	:45 1-2
2.	Stearns	60	Wilson Rutherford	:46 1-4
3.	Stearns	60	Leo Shaab	:49 1-4
4.	Stearns	60	J. G. Nassauer	:52
5.	Winton	45	J. Basilicato	1:18

CLASS G—CARS DRIVEN BY AMATEURS, $3,000 AND UNDER.

1.	Ford	15	Osborne I. Yellott	1:05
2.	Winton	48	H. H. Heyser	1:10 1-2

CLASS H—CARS DRIVEN BY AMATEURS, $3,001 AND OVER.

1.	Stearns	60	W. W. Lanahan	:46
2.	Stearns	60	J. G. Nassauer	:51 1-2
3.	Stearns	60	S. A. Nattans	Withdrawn

CLASS K—FREE-FOR-ALL.

1.	Stearns	60	Wilfred Smith	:43 1-2
2.	Stearns	60	Wilson Rutherford	:45
3.	Stearns	60	J. G. Nassauer	:48
4.	Chalmers-Detroit	40	W. C. Hood	:50
5.	Stanley	10	H. W. Gill	:50 3-4
6.	Mitchell	30	W. P. Shuler	1:23 1-2
7.	White Steamer	30	L. W. Tremblay	1:34

SAID BY MEN PROMINENT IN THE INDUSTRY

David Fergusson, Mechanical Engineer, of the George N. Pierce Company, has just returned from abroad, where he visited the principal automobile factories of England and France, having inspected the new models of the leading German and Italian makes of cars. As a result on his observations Mr. Fergusson says: "Two tendencies in construction stand out prominently above all others. The first is the wide adoption of the shaft drive among makers who have, heretofore, produced none but chain driven cars, and the other is the abandonment of ball bearings for crankshafts in favor of plain bearings, in notable instances. The most prominent general tendency aside from the matter of final drive is the reversion to plain bearings. Several years ago two manufacturers, one French and the other German, both of whom stood high in their own countries, adopted ball bearings for the crankshaft. The outcome of their policy was watched with a great deal of interest by automobile makers throughout the world. This year marks the definite abandonment by them of their experiment, and their return to plain bearings."

C. F. Jensen, President of the National Retail Automobile Dealers' Association.—"Since leaving my headquarters in Joliet, Ill., I have seen a great many agents and they are all signing up for a great many more cars next year than ever before. It is remarkable how many agents in the small towns are contracting for 50 to 150 cars and declaring there is no question of their ability to dispose of them. The farmers in Kansas, Iowa, Nebraska, and Minnesota, are in fine financial shape and ready to buy cars, although the moderate priced machines will be most in demand among them. The cars selling for $1,200 or less are taking very well. while there is a steady demand for the high wheel buggy type. Our Dealers' Association is growing rapidly; the agents for cars appreciating the fact that many advantages can be secured by co-operation. There are many abuses in the trade which the Association will try to remedy and in doing so, we believe the manufacturer will be benefitted as well as the dealer. We are trying to help the agents to secure the agencies for cars in which there is a good profit and a fair working basis." Mr. Jensen arranged for the automobile show at Grand Central Palace to be the headquarters for the Dealers' Association in New York and for each member of the Association to have the courtesies of the exhibition.

Maxwell-Briscoe Motor Company, Through President Benjamin Briscoe, sets at rest the many merger rumors that have figured in the columns of the press of late. According to Mr. Briscoe's statement the Maxwell people are not involved in any merger negotiations whatever, nor do they know of serious negotiations being carried on elsewhere in the industry. As far as the Maxwell product is concerned, it will be turned out in three factories of the company, namely; New Castle, Tarrytown, and Pawtucket, and the output will be sold just as heretofore.

H. R. Averill, General Sales Agent, York Motor Car Company, York, Pa., returning from an extended trip through New York and the New England States, predicts that the 1909 season will be one of the greatest in the history of the automobile. While on his trip Mr. Averill met some of the most prominent auto dealers in the northeastern section of the country whose opinion it was that the 1909 season would be a record breaker. Pullman models are much in demand, and during the coming season more than 400 cars will be turned out.

DECORATIVE FEATURES OF PALACE SHOW.

A representative of the S. R. Ball Company, which has the decorating contract for the A. M. C. M. A. show which opens in the Grand Central Palace, New York City, on New Year's Eve, has returned from a trip abroad, where he has been looking up ideas to be embodied in the decorative scheme of the show. One of the artistic features will be 12 full-size statues of a woman holding above her head an automobile wheel with flying wings. These figures of white ivory composition draped in flowing robes will look down upon the main floor from the lower balcony. Other statues of much larger dimensions will be placed in the lobby, main stairways, and throughout the main court. The plans, if completed as mapped out, will mark a distinct advance, from the decorative standpoint, over anything that has previously been attempted in the automobile show line.

Goddess of Speed.

One of the 12 figures that will adorn the first balcony of the Grand Central Palace.

TEN NEW AUTOS A DAY.

AKRON, O., Nov. 23.—The International Harvester Company is turning out ten light-running automobiles a day at its factory in this city, and a daily sight is the running of test cars on the streets and highways. The cars are used to test the engines, and each engine is run daily about 100 miles, ten cars being run every day. The same cars are used all of the time, new engines being put in daily. The roads in this vicinity are also used extensively by the Peerless factory in Cleveland, and it is for test purposes as well as for quick passages between the two cities that autoists of Cleveland and Akron are anxious to have Brecksville and Akron connected with a paved or macadamized road, as is now under consideration, in order to have an improved road all the way through.

YORK'S AUTO PLANTS GET BIG ORDERS.

YORK, PA., Nov. 20.—York's automobile trade is enthusiastic, and large orders are received daily by the two local plants. The Pullman plant is running full time, having many large orders booked for the new 1909 cars.

The Hart-Kraft Motor Company, manufacturers of light gasoline delivery wagons, have entered into an agreement with the Post Motor Company, 1623 Broadway, New York, by which more than 1,100 wagons are to be erected and delivered for the metropolitan trade.

INDIANA DEALERS HAVE SUCCESSFUL YEAR.

INDIANAPOLIS, IND., Nov. 24.—Local dealers are just closing the most successful year in their history. This may seem a bit strange, in view of the recent financial stringency, but is nevertheless true as proved by the registration records of the Secretary of State.

The number of automobiles sold to Indianapolis people to November 15, this year, is 389. The total number sold in the State has been approximately 3,100, and it is estimated that about 50 per cent. of the automobiles sold in Indiana go through local dealers. It is probable that the total automobile business done by the dealers this year will reach $1,500,000.

DECORATIONS FOR THE GARDEN SHOW.

Since the big automobile shows began to be held in Madison Square Garden, each successive year has witnessed a marked improvement in the decorative scheme used for the occasion until, during the last four years, the interior of the famous old exposition hall has been made notably more magnificent for the exhibit of motor cars than for any other event in the place. A praiseworthy fact in connection with this dressing of the place is that the progress has been from the merely elaborate and ornate toward the chaste and elegant. At the forthcoming show, January 16-23, under the auspices of the Association of Licensed Automobile Manufacturers, the step in this direction will be more marked than ever before. There will be magnificence and elaborateness, but there will be less profusion, more simplicity and more richness in the general scheme. There will be a gratifying lack of the plaster statues seen in former years, and a tone of more solidity will prevail, as being more becoming to the standard makes of the oldest automobile makers that always comprise the Garden show. One of the few really showy pieces of decoration this season will be a sort of Garden fountain near the Madison avenue entrance. This is in the form of a low abutment of gray stone, curving about the first exhibition spaces facing the entrance. It will have a trough-like basin, into which water from griffin mouths will spray upon the electrically iridescent pool beneath and this falling water, too, will be electrically radiant. In the pool of the curving basin there will be goldfish and pond lilies, some of the lilies natural and some artificial. From the artificial flowers electric lights will radiate, while a concealed row of lights under the coping of the trough illuminates the falling spray.

New Emblem of the A. L. A. M.

Curved, Troughlike Electric Fountain that Will Be Near the Entrance at Madison Square Garden Show.

News in General

Chinese Ambassador Wu Ting Fang Rides in Eugene Christian's White Steamer.

Doubting Thomas Caved In.—The Rapid Motor Vehicle Company, of Pontiac, Mich., is circulating a story of "Doubting Thomas," who rode in the 1908 Glidden Tour in a Rapid truck. As the story goes, it was Thomas (not the truck) that "fell." The little pocket edition is in itself a work of art, aptly illustrated, and the performance of the Rapid truck is portrayed in terse, brisk terms. The theme is but a fitting presentation of what was at the time considered a remarkable performance. If touring cars came through with a clean score, it was but a normal expectation, but few were the critics that reflected a clean score for an overloaded truck under the savage punishment meted out. At the end of the tour the Rapid truck made for home under its own power over even worse roads than the "Glidden orbit," and arrived in good time, covered with well-earned glory and a smear of mud.

Diamond Company Paves a Street.—Although Akron, O., has profited a great deal from the rubber business, the Diamond Rubber Company feels that, by a recent agreement with the city authorities, it is able to help out the city in a very direct way. Desiring the vacation of a small part of a street in order to extend one of the new buildings, the company agreed to pave the remainder of the street in return, and the city accepted the proposition.

Something New for Auto Buyers.—The Winton Motor Carriage Company has issued its latest booklet under the title "Twelve Rules to Help Buyers," in which, as this head indicates, will be found a dozen methods as set down by the Winton Company which should be used when determining the merit of any automobile. Simplicity and freedom from all technical terms is the keynote which should make this interesting to the prospective buyer.

Petrel Motor Car Company a New Concern.—Through an error made in THE AUTOMOBILE issue of November 19, it was said the above named company was a reorganization of the defunct Earl Motor Car Company, of Kenosha, Wis. The plain facts are as follows: The Petrel Motor Car Company is a new organization and has no connection whatever with the defunct Earl concern excepting that the old Earl plant was purchased.

Cleveland to Have Taxicab Service.—The Citizens' Taxicab Company, of Cleveland, is making arrangements to put taxicabs on the streets of that city. It is announced that the Chalmers Detroit Motor Company, of Detroit, will furnish twenty of these taxicabs, ten of which are to be in service by the first of the year. The Charles B. Shanks Company, of Cleveland, will back this new venture.

Cleveland Motor Car Company's Officers.—At a meeting of the board of directors of the Cleveland Motor Car Company at the offices, 1659 Broadway, New York, on Friday, Nov. 20, the following officers were elected for the ensuing year: President, James Laughlin, Jr.; vice-president, James Laughlin, 3d; general manager and treasurer, James B. Strawbridge; secretary, Sidney H. Veal.

Speedwell Company Puts on Night Force.—The announcement comes from Dayton, O., that the Speedwell Motor Car Company of that city has found it necessary to put on a night shift. General Manager Loomis says that now Taft has been elected he feels more certain than ever that his company will be one of Dayton's largest industries in the near future.

Bergman Tool Company, Buffalo.—The Bergman Tool Company has bought property on Niagara street, Buffalo, where it is building a three-story concrete structure for the manufacture of wrenches, pliers, braces, etc. The National Sales Corporation, of New York, Chicago and Buffalo, has been appointed factory sales agent to the trade.

Union Pacific Gasolene Cars.—The gasolene motor coach business of the Union Pacific Railway Company has assumed such proportions that an independent company has been formed for their manufacture, known as the McKeen Motor Car Company, of Omaha. Connecticut coils, timers and indicators are used on all these railway motors.

Schaub Automobile Motor.—On page 695 of THE AUTOMOBILE, November 12, among other statements the rating of the two-cylinder Schaub motor was given as 4-horsepower. Later advices from the Schaub & Son Machine Company, 3064 Henshaw avenue, Cincinnati, O., is to the effect that this particular motor is rated at 10-horsepower.

Palace Show Will Have an Orchestra.—The brass band usually in evidence at former automobile shows will not be heard at the Palace show, which opens New Year's Eve, in New York. Instead the committee has provided for a full orchestra of twenty-five pieces, using only string instruments.

Road Work in the Southwest.—The automobile traffic between Silver Bell and Tucson, Ariz., has increased to such an extent that the old road connecting the two cities did not suit the auto owners, who have been able to get a better and shorter road constructed for them.

Count Goes Back to Japan.—Count Tsatsuma Ninagawa, who was sent to the United States by the Japanese Government to learn the automobile business, has left Dayton, O., where he has been for the past year in the shops of the Speedwell Motor Car Company.

Bus Lines Prosperous in the West.—M. S. McArthur and Neil Hinckley have been so successful with their bus line between Los Angeles and Palo Verde that they will increase the service by the addition of two 50-horsepower Apperson touring cars.

Hayes Wheel Company.—The Hayes Wheel Company has been organized with C. B. Hayes as president and general manager, to take over the plant and machinery formerly owned and operated by the National Wheel Company, Jackson, Mich.

Continentals at the Olympia.—One of the first bits of news to reach this country from the Olympia Exhibition, in London, is to the effect that out of 2,218 tires shown, 678, or 30 per cent. of them, were Continentals.

More Room for G. & J. Company.—The G. & J. Tire Company, of Indianapolis, has broken ground for the erection of an addition to its factory which will increase the floor space by 50,000 square feet.

Kissel Company Increases Capital.—The Kissell Motor Car Company, of Hartford, Wis., has filed an amendment to its articles of incorporation, increasing its capital stock from $100,000 to $200,000.

IN AND ABOUT THE AGENCIES.

Federal Tires, Boston.—The Standard Tire & Rubber Company, with offices and salesrooms at 102 Portland street and warehouse at 84 Chardon street, Boston, will soon announce the opening of an uptown branch to take care of the automobile trade in the sale of the new Federal tire handled by this company. The tire is made by the Federal Rubber Company, of Milwaukee, of which William P. Cronin, at one time manager for the Diamond Rubber Company, is president, and James S. Waddell is treasurer. Osborne S. Tweedy, formerly with the Diamond Company in Chicago, has been appointed sales manager, and Otis R. Cook, for twelve years with the F. R. Goodrich Company, will be manager of the tire department.

Delauney-Belleville, New York City.—J. J. Mann, for the Delauney-Belleville Company, of St. Denis, France, has completed arrangements with Brewster & Company, Broadway and Forty-seventh street, New York City, to act as agents for these cars in all the Eastern States. The body-building facilities of this concern should be a large factor in properly placing the Delauney-Belleville cars before the public.

Stearns and Midland, Milwaukee.—The Wisconsin Automobile Exchange, State agents for the Stearns and Midland lines, has moved to its new and permanent quarters at 239-241 Wisconsin street, adding another big agency and garage to the East Side motor row in Milwaukee. The repair line will be a specialty. A public garage will be maintained. A. E. Eckstein is general manager of the company.

Middleday, Philadelphia.—Middleday cars will be represented in Philadelphia by William P. David, formerly connected with the Kelsey Motor Car Company. Salesrooms have been arranged for on North Broad street, next to the West-Stillman Company.

Moline, Illinois.—Otto C. Owen, a brother of R. M. Owen, has taken the agency for the Moline cars for the State of Illinois outside of Chicago and vicinity. Mr. Owen will continue to act as the State representative of the Reo cars.

Overland, New York City.—The New York agency of the Overland Automobile Company has moved its quarters to 1657 Broadway. A Brooklyn salesroom will be ready for occupancy in a few days at 315 Livingston street.

Pope-Hartford, Waterbury.—A newly organized concern incorporated at $50,000, by C. S. Woodward, I. F. Backelder and H. F. Stackman, has taken the agency for the Pope-Hartford cars in Waterbury, Conn.

Stearns, Milwaukee.—The Wisconsin Automobile Company has been appointed agent for the Stearns car in Milwaukee. This company is erecting a two-story garage, 50 by 100 feet, on Wisconsin street.

Franklin, Hartford, Conn.—The new Franklin garage, conducted by Robert R. Ashwell at 341 Trumbull street, was formally opened last week, adding to Hartford's garages one of the largest in the city.

American, Los Angeles, Cal.—The American agency has been taken for Los Angeles by the American Motor Car Company, which has opened headquarters at Washington and Main streets.

Ke-Pa-Go-In Tires, Cleveland.—The Cleveland agency for the Ke-Pa-Go-In tires has been taken by the newly organized Zenith Motor Goods Company, of 2062 Euclid avenue.

Oakland, Hutchinson, Kan.—The Salt City Motor Company has opened a garage and salesrooms in Hutchinson, Kan., and taken the agency for the Oakland car.

Thomas Shock Absorbers, Philadelphia.—The Penn Square Automobile Company will be the Philadelphia agents for the Thomas shock absorbers.

Knox, Providence.—The Knox Automobile Company will be represented in Rhode Island by the Hitchcock-Banks Motor Car, 179 Aborn street, Providence.

Pittsburg "Six," Boston.—Stanley Webster has been made New England distributer for the Pittsburg "Six," his location being 1024 Boylston street, Boston.

Lane Steamer, Boston.—The Boston agency for the Lane steamer has been taken by the Cushman Motor Company, of 91 Church street.

Mitchell, Eastern Pa.—The Penn Motor Car Company, of Philadelphia, now represent the Mitchell car throughout Eastern Pennsylvania.

Cadillac, Cleveland.—The Barger Auto Company, Cleveland, agents for the Cadillac, has just taken possession of its new salesroom.

Thomas, Southern California.—R. C. Brassy, of Los Angeles, has been appointed agent for the Thomas cars in Southern California.

Pullman, Pittsburg.—The Auto Brokers' Exchange has been appointed the Pittsburg representative for the Pullman cars.

Franklin, Milwaukee.—The Milwaukee agency for the Franklin cars has been taken by Wm. F. Sanger.

PERSONAL TRADE MENTION.

P. J. Holm, formerly superintendent of the Northwestern Steel & Iron Works Company, of Eau Claire, Wis., has resigned and will go into the automobile motor and gasoline engine manufacturing field. Mr. Holm has organized the Holm Machinery Manufacturing Company, incorporated under the laws of Michigan, capital stock $100,000, and will build a large factory at Sparta, Mich. The plant will consist of a foundry, 200 x 200; machine shop, same dimensions; shipping house, pattern shop and storage building, 50 x 100 feet, with a testing shop of the same dimensions. Before going into the project, Mr. Holm secured contracts from automobile manufacturers for engines that will keep the plant busy for some time.

Theodore Deetjen, secretary and treasurer of the Wisconsin Automobile Exchange, 239-241 Wisconsin street, Milwaukee, and an assistant are making a tour of twenty-five of the largest cities of Wisconsin in Stearns and Midland demonstrators. The route will take them into every section of Wisconsin. This is the first time any Wisconsin agent has gone after business in this way, and the result of the personal tour is being watched with interest.

Monte Cross, shortstop for the Philadelphia Athletics in their championship days, and last year manager of the Kansas City American Association club, is putting in the winter in the shop of the Philadelphia branch of the Winton Motor Carriage Company, at 246 North Broad street. Monte expects to go into the automobile business for himself in the near future.

F. T. Sanford, who has been connected with the Napier Motor Company, of England, and well known to the automobile trade of New York, has opened a garage on Forty-third street, just off Fifth avenue, where he has the agency for the Thames six-cylinder cars.

Charles S. Henshaw, of Boston, started from New York November 23 in a 1909 Haynes car on a 10,000-mile trip, which will include all the principal cities of New England. He will be accompanied by Loring Wagner, of Chicago.

E. J. Wall, for many years traffic manager of the Pope Manufacturing Company in Hartford, Conn., has gone with the New England branch of the Thomas B. Jeffery & Company, in Boston, in the capacity of business manager.

Dave Henry, formerly traveling salesman for the E-M-F Company, has accepted the position of sales manager for the Interstate Motor Car Company, of Chicago.

Charles P. Saunders, well known in the tire business in New York and Philadelphia, has joined the selling forces of the Firestone's Company's branch in Philadelphia.

Morgan R. Davis has been appointed general manager of the Penn Motor Car Company, of Philadelphia, agents for the Mitchell car in Eastern Pennsylvania.

Louis Elmer, the Ford agent at Hartford, Conn., is slowly recovering from his severe attack of pneumonia at the Hartford hospital.

J. D. Porter, who has been on the road for the E-M-F Company, has gone with the Cleveland branch of the Studebaker.

Quitting Time at the Factory of the H. H. Franklin Mfg. Co.

At the factory of the Franklin, Syracuse, N. Y., 6,000 automobiles have been built, and of the original thirteen Franklin cars, made in 1902, eight are known to be in actual service. The Franklin factory has a floor space of 257,725 square feet. There are twenty-five models made, and 1,550 men are employed.